# agriculture

Vol. 74 No. 7 July 1967

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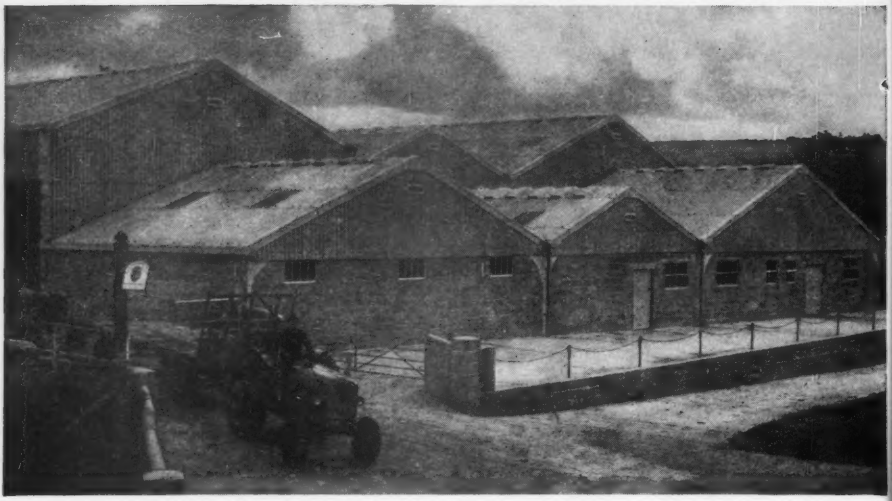
Spraying potatoes against blight

## Potato Blight Control at Terrington E.H.F.

page 328



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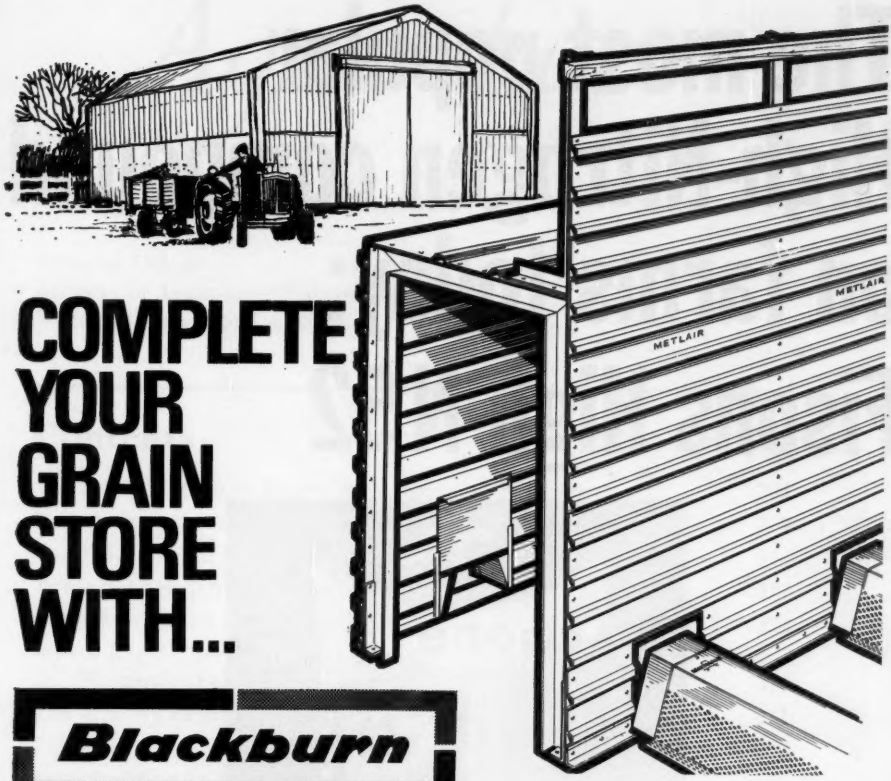


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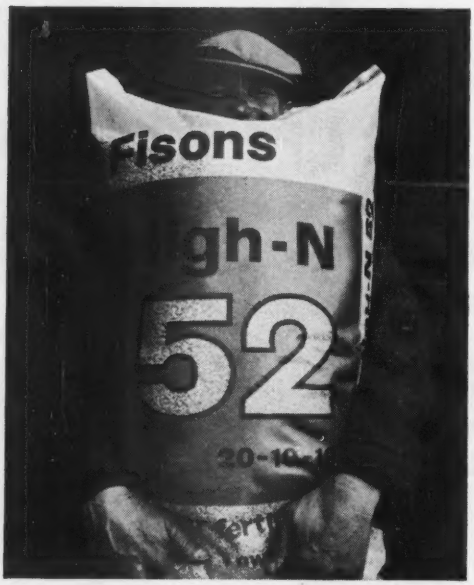


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# Agriculture

VOLUME 74 · NUMBER 7 · JULY 1967

Editorial Offices
Ministry of Agriculture, Fisheries and Food
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## Contents

| | page |
|---|---|
| The Rabbit Clearance Society Movement *V. H. Bath* | 307 |
| Bronchitis in Calves *W. H. Parker* | 309 |
| Cereals—Forward Contracting *W. J. Hazeldine* | 314 |
| Why erect new farm buildings? *Ralph Whitlock* | 317 |
| Gross Margins on Hill Farms *K. C. Yates* | 322 |
| Potato Blight Control Trials at Terrington Experimental Husbandry Farm *J. L. Short* | 328 |
| The Ministry's Publications | 331 |
| Leisure in the Countryside *F. G. Holland* | 332 |
| Pony Breeding on the Hills *Sydney Moorhouse* | 335 |
| Efficient Vegetable Production on the Wirral *A. F. Hendy* | 339 |
| Single-Suckler Herds—A Survey in Norfolk *Brian G. Williams* | 344 |
| Farming Cameo Series 4: 1. The Isle of Anglesey *R. D. Williams* | 348 |
| From the ALS: Multi-purpose Ventilated Flat Floor *K. S. Lycett* | 350 |
| Book Reviews | 352 |
| Agricultural Chemicals Approval Scheme | 354 |

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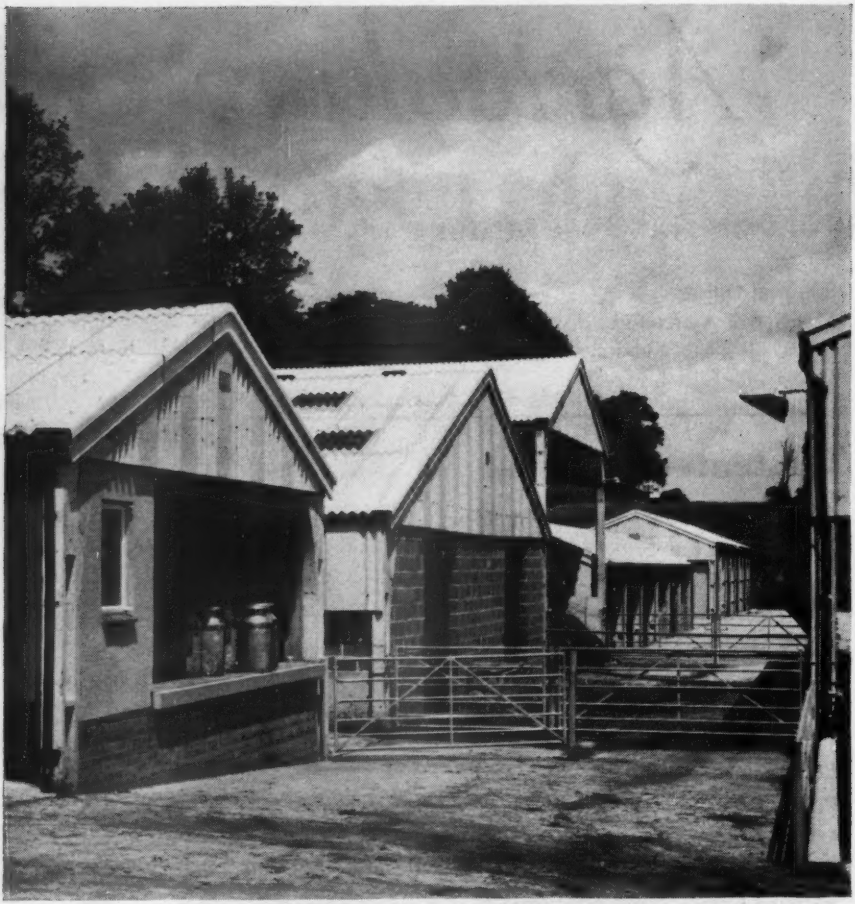

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**AGRICULTURE** JULY, 1967

# The Rabbit Clearance Society Movement — A New Look

IN his article on rabbits and myxomatosis (*Agriculture*, May, 1966) Dr. Mead-Briggs outlined the spread of the disease since its first appearance in this country in 1953 until, by 1961, it had become firmly established as an enzootic disease in almost every county in England and Wales. Although less virulent strains of myxoma virus now occur, from which some infected rabbits recover, leading to an increased proportion of immune rabbits, the disease still takes a heavy toll. It is a powerful ally in the war which rabbit clearance societies have been waging since 1958. Some, in fact, have waged the war so well that they seem to have worked themselves out of a job and have been hard-pressed to retain the support of their members. The movement, which made such rapid growth in the first few years of its existence had, by 1965, lost much of its momentum and was in need of a stiff tonic.

Faced with this situation the Ministry has recently completed a re-appraisal of its rabbit control policy. It has been aided by the findings of an investigation into the management and operational efficiency of a number of societies undertaken two years ago by Mr. F. J. Smith, an experimental officer at the Nottingham Regional Office. Among his many recommendations, Mr. Smith declared in favour of retaining the principle of voluntary membership of societies, supported by vigorous action by the Ministry to ensure that societies adopted efficient control methods and that non-members fulfilled their statutory obligation to keep rabbits down. The Ministry prefers to seek the enforcement of the statutory obligation by persuasion and is usually successful. Pressure will not, however, be withheld when rabbit control continues to be seriously neglected. It has sometimes been suggested that as soon as membership of a society covers a high enough proportion of the land in its area, membership should become compulsory. But compulsory membership of a voluntary society would, in fact, be a contradiction in terms; in reality the suggestion amounts to the setting up of boards empowered by statute to levy rates on occupiers. A poll organized by the National Farmers' Union has shown no general support among farmers for compulsory membership.

Because some societies were chasing too few rabbits and needed some additional grant-aided activity to retain the support of their members and

bring in new ones, Mr. Smith recommended that mole destruction should qualify for the 50 per cent grant so long as a satisfactory standard of rabbit control was maintained. This recommendation, which endorsed what had long been urged by the Federation of Rabbit Clearance Societies and others, has been accepted. The decision, announced by the Minister in reply to a Parliamentary Question on 21st March, was favourably received by members of the Federation at their Annual General Meeting on the following day.

One recommendation on which Mr. Smith placed emphasis was the introduction of legislation to ban the sale of wild rabbits and their skins. The reason for making this recommendation is clear, but close study by the Ministry showed that it would have considerable practical difficulties. A marking system would be needed to differentiate between wild rabbit meat and that of imported and domestic rabbits, and this would be very difficult to enforce in the courts. Even if sales of wild rabbit meat in shops could be prevented it would be impossible to stop private sales on a flourishing black market and the law would soon be brought into disrepute. This recommendation could not, therefore, be accepted, but it is essential that societies should take steps to see that their operators do not sell the rabbits they take in situations where control by gassing is not practicable

Six recommendations were designed in one way or another to improve the management of societies and the efficiency of their control operations. More liaison between divisional office field staff and societies, more technical advice, adequate day-to-day supervision of operators by societies themselves were all covered in these recommendations. With some modifications, they have been accepted for immediate implementation. Societies will in future have to meet basic standards of viability and efficiency, and the payment of grant will depend upon the satisfactory completion of an approved plan of operations.

Mr. Smith drew attention in his report to areas of special difficulty from the point of view of rabbit control. These are mainly areas where the reclamation or improvement of land would be impracticable or uneconomic. He recommended that research should be actively pursued to develop new methods of control. Since the law prohibits the laying of poisoned baits for rabbits, this is an extremely difficult field for research. Biological work has started on the use of reproduction inhibitors on a purely experimental basis, but progress is likely to be slow. Meanwhile the best defence in these difficult areas is to remove the cover in which rabbits are hiding, and the 50 per cent grant paid for this work under the Ministry's scrub clearance scheme—with a higher rate of grant on non-agricultural land—is a strong incentive to occupiers to use this means of carrying out their statutory responsibility to control rabbits on their land.

As the Minister said in a special message to the Federation, membership of a rabbit clearance society is without doubt the best form of insurance against the rabbit which, with its high potential for causing widespread damage, remains agriculture's most serious pest. It is to be hoped that with the new help recently introduced the society movement will go on to a more expansive and assured future. There is plenty of scope for this since there are no societies at all in half of England and Wales, and in the other half their membership covers only half the farm and woodland acreage.

V. H. BATH

## Animal Health and Disease Prevention

# Bronchitis in Calves

W. H. Parker

BRONCHITIS is considered by doctors to be a peculiarly British disease. Though this has no connection with bovine respiratory diseases, few cattle in this country are reared without at least one attack of bronchitis. Two diseases occur, quite different in origin, but with symptoms that are indistinguishable except in severe attacks. One of them is caused by worms in the lungs, parasitic bronchitis or husk, and occurs almost exclusively in grazing animals. The other is associated with a virus infection and is chiefly a disease of housed young stock. The name sometimes used for this disease by farmers and others is 'virus pneumonia', but it is an unsatisfactory name because it is often not sufficiently serious to warrant being called 'pneumonia'. I prefer 'epizootic bronchitis'.

The early symptoms of these two conditions can be described together. The first sign is a deepening and increased rate of the breathing. Before an attack it is often difficult to recognize the action of breathing but when bronchitis has started more effort is required. The quickened flank movements are apparent to the observant eye. A cough usually develops but is sometimes not at all obvious unless the stock are driven round the field or building. In either disease if the attack remains mild no further symptoms

*Narrow rectangular yard fully open one side but completely closed at the end and other side*

*A covered yard surrounded on three sides by other buildings*

will arise. The respiratory rate may fall slightly but remains higher than it was before the symptoms first appeared. Occasional coughs will continue but the calves should thrive. If the attack is less mild and the breathing becomes more obvious the appetite is depressed and the calves cease to thrive so well. Soon they may begin to lose weight.

## Husk

Husk should never get beyond this early stage even if the outbreak is sudden for, if proper treatment is given early, stock will start to improve rapidly and throw off the attack. However, in the absence of treatment a severe attack will develop into pneumonia, the outcome of which is quite unpredictable. Some animals recover; others drag on a useless existence for several weeks before succumbing. Some die suddenly and unexpectedly, but the most characteristic picture is the calf fighting for breath with head and tongue extended to the limit. Every effort is directed to redressing the increasing shortage of oxygen. No energy is spared for eating or even for coughing. This situation may last for a few days before death mercifully intervenes.

### *The world of the worm*

The adult female worm, residing in the lung, gives rise to enormous numbers of larvae which have to leave the host to continue their life. They are coughed up and, for the most part, swallowed, to be passed out in the droppings. Over a period of 3–4 weeks a calf may deposit several million larvae on the pasture, but their survival rate is very low, being only about 5 per cent in the most favourable circumstances. Even so, the pasture carrying a group of affected calves may become heavily contaminated, and a light contamination is sufficient to cause a severe outbreak in a young susceptible animal. Contamination most often arises because young cattle, possibly in their second grazing season, deposit a few larvae as a result of worms picked up during the previous season. Survival of larvae over the winter in the east of Britain is unlikely though it can occur in the milder moist climate of the West and in Ireland. The greatest natural hazard of the free-living larvae is the drying effect of the sun. Few if any larvae are

likely to survive a summer drought on a bare pasture. Most outbreaks of husk occur either in early summer or after the return of moist conditions in late summer or autumn.

*Control of husk*

There are three aspects of control: husbandry, the use of drugs and the use of vaccine, and all three are dominated by the remarkably high, rapidly developing immunity produced by this worm.

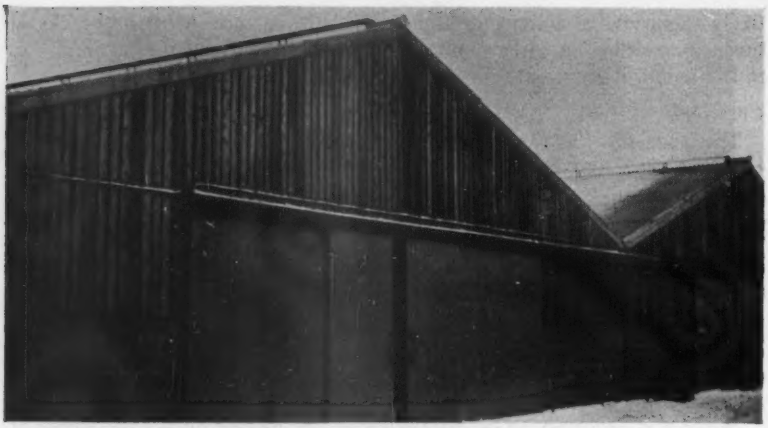
Our climate is so favourable to the worm that eradication is not possible. The aim of husbandry must be to protect the susceptible young animal in its first grazing season and at the same time to build up an immunity, which is likely to be sustained throughout life by further frequent ingestion of the worm. When a calf is first turned-out it may get a lethal dose of worms by grazing a pasture with a larval count as low as one per pound of herbage, although, when immunity has become well established, it may withstand an infestation of several hundred larvae per pound.

While it is necessary to be careful about the grazing during the whole of the first season it is the period following first turn-out that is most important. A pasture that has carried no cattle or only adult cattle all winter is best. On no account should calves follow cattle a year older than themselves. Young calves are best turned-out altogether for if they are turned-out in groups, the first group may heavily contaminate the pasture while building up its own immunity with devastating results for those turned-out later. Larvae picked up from the pasture mature in only 3 weeks and themselves begin to produce large numbers of offspring.

A few drugs are known which act on lung worms within the host. In this country the most effective one in use, diethylcarbamazine, is sold under a multiplicity of trade names. It is highly effective but there is one limitation. In a heavy attack, unless treatment is given when the symptoms are first recognized, damage to the lungs may be severe and permanent. Even total removal of the worms later in the disease may fail to save the calf's life.

The discovery in the late '50s' of a vaccine against husk was something of a sensation. Larvae attenuated by X-rays on a scale 60 times the fatal dose for any mammal, are given by mouth to calves before turning them out. Though the larvae fail to reach maturity they impart a fairly high degree of immunity which will be reinforced by any natural ingestion of lungworm larvae when grazing. The method of preparation of this vaccine is necessarily much more involved than that of a bacterial vaccine. It is therefore expensive.

*A purpose-built house for intensive beef production*



*A successful type of house with continuous outlet ventilation at both the double ridges*

The decision as to whether to give the vaccine as an insurance or to depend on treatment if an outbreak occurs must depend on circumstances. If the vaccine is used all the susceptible animals on the farm must be vaccinated or there may be a serious breakdown of immunity. Whatever policy is followed on drugs and on vaccine there is no substitute for the right husbandry of calves.

## Epizootic bronchitis

When calves affected with this disease become unthrifty some degree of pneumonia must be assumed and some of the group are likely to die. The most significant fact about this disease is that while the infection is almost ubiquitous, particularly if calves are bought from other farms, the severity varies enormously. In some buildings the calves cough but thrive; in others they are unthrifty and deaths occur. This is due to the climatic differences within the buildings. Young cattle require a free movement of air without draught and a warm, dry bed. They do not thrive when water condenses on the underside of the roof and then falls on their backs and their bed. The problem therefore is to remove humidity without creating a draught in doing so. The breath from stock is continually adding to the moisture in the air. From a large calf this amounts to about a gallon of water a day. In small buildings and at low intensity of stocking no moisture problem may arise. The narrow rectangular yard about 25 ft wide, fully open at one side but completely closed at the ends and the other side (see photograph on p. 309) rarely presents a problem even though temperature varies a good deal because of the very free interchange of air. With enclosed buildings temperature changes become important because of their effect on humidity. Cattle will often thrive in a relative humidity over 80 per cent, but in an enclosed building carrying a lot of cattle, it tends to rise to between 90 and 100 per cent in the absence of insulation. This happens in winter in the small hours of the morning when the temperature is at its lowest. Covered yards surrounded by other buildings (see photograph on p. 310) present

almost insuperable ventilation problems. By contrast, a well-insulated building with ridge fan extractors and an even and generous supply of air inlets above the backs of the cattle (see photograph on p. 311) will successfully house beef cattle at a density of 30 sq. ft per head provided a width of 60–70 ft is not exceeded. Wider buildings require space boarding for effective ventilation. The highly successful house shown in the photograph on p. 312 is 135 ft wide with generous continuous outlet ventilation at both the double ridges. Anyone contemplating a change of practice involving a move to intensive cattle raising, particularly if new buildings are involved, should study ventilation requirements very carefully (Sainsbury 1965)[1]. Despite the great expense involved livestock buildings are often erected without this knowledge.

[1]Sainsbury, D. W. B. (1965). The Housing of Large Animal Livestock. *Vet. Rec.* 77, 945.

This article has been contributed by **W. H. Parker, B.Sc., M.R.C.V.S., N.D.A.,** who is Superintending Veterinary Investigation Officer for Wales. He has made a special study of respiratory diseases of cattle and was responsible for the discovery of the first effective treatment of parasitic bronchitis.

## TRACTOR SAFETY CABS

The Agriculture (Tractor Cabs) Regulations, 1967, were laid in draft before Parliament on the 31st May, 1967. If approved, the Regulations will apply to England, Wales and Scotland, and will require new tractors sold or let on hire on or after 1st September, 1970, to be fitted with safety cabs or safety frames. They will prohibit the use by an agricultural worker of a new tractor after that date unless it is so fitted. The prohibition on use will be extended on 1st September, 1977, to tractors which are first sold for use by the purchaser in agriculture before 1st September, 1970.

The Regulations will provide for exemption from the requirement to use a safety cab when this would be impracticable in hop-gardens, orchards and buildings.

Provision is made for the issue of certificates of approval for safety cabs and frames jointly by the Minister of Agriculture, Fisheries and and Food and the Secretary of State for Scotland, and for the marking of approved cabs and frames in a specified manner. These parts of the Regulations will come into force immediately they are made so as to enable cabs and frames to be approved and properly marked before 1st September, 1970.

Copies of the draft Regulations may be obtained from H.M. Stationery Office, or through any bookseller, price *1s. 0d.* (by post *1s. 3d.*).

# Cereals

## Forward Contracting

**W. J. Hazeldine**

### The first scheme

THE Home-Grown Cereals Authority had a mandatory responsibility under the Cereals Marketing Act, 1965, to introduce a forward contract bonus scheme for wheat and barley as soon as possible after its formation. The Authority obviously had some latitude in its interpretation of this period and, bearing in mind the date of its formation, i.e., 3rd June, 1965, it could reasonably have left its first scheme until the 1966/67 cereal year, but the Authority considered that it was important not to delay. It was necessary, first of all, to stimulate interest in forward contracts and, secondly, to gain early practical experience and knowledge of the workings of such a unique scheme. Despite the handicap of time, the first contract bonus to cover deliveries from December to June in the 1965/66 cereals year was devised, approved by Ministers and announced on 2nd July, 1965. In these circumstances, it was not to be expected that this scheme would be perfect in its first year. A flat rate bonus of 10*s.* a ton was fixed and it was estimated that forward contracts for a total of two million tons of wheat and barley would be registered. In the event, registered contracts for which claims were received amounted to three and half million tons. The 1965 harvest was then a record in terms of tonnage—over 13 million tons. The quality of the harvest was not of the highest, and there was a smaller quantity of good milling wheat available than in the previous year. The problem of the disposal of a record crop of barley, with its high proportion of feed barley, was emphasized by the larger quantity of wheat claiming a share in the animal feed market. Despite this, the annual average Corn Returns price for barley was 21*s.* 10*d.* a cwt—the highest since 1958/59; in the case of wheat, the average price was 21*s.* 1*d.* a cwt—only 3*d.* lower than the previous year when the crop was smaller and of better quality.

It is impossible to separate the influence of the scheme on the cereals market from the other influences but informed opinion has said that the barley export trade received a useful stimulus from the assurance of supplies provided by the scheme; and forward contracting was undoubtedly practised by many farmers for the first time.

### The second scheme

As was to be expected, the lessons learned from the first scheme led to changes in the character of the scheme for 1966/67. The major change was to extend the minimum period between the contract month and the delivery month from one calendar month to two calendar months. In addition, a

differential rate of bonus of 12*s.* 6*d.* a ton was included to encourage deliveries three or more months ahead. These devices were introduced to improve the certainty of forward supplies. The period covered by the scheme was extended to include the month of November. Lower rates of bonus were paid for deliveries in this month and December, 1966.

A new type of contract (Type B) was also introduced permitting deliveries over a period of two consecutive months; these contracts set out to provide greater flexibility within the scheme. But in order to control their excessive use, some conditions were attached.

Some 15 per cent of registered contracts were not fulfilled in the first year, so it was decided that some form of penalty should be devised to ensure maximum fulfilment. A clause was written into this scheme which gave a warning that in the event of the failure to fulfil a registered contract for reasons not acceptable to the Authority, the party in default, whether the grower or the buyer, might be debarred from registering future contracts.

The scheme for the year 1966/67 provided its own particular lessons as the pattern of registrations was markedly different from that shown in the first year. There was a heavy rate of registrations, particularly for barley, during the early part of the contracting period, with a noticeable tailing off towards the end. A very high proportion of contracts, well over 60 per cent, were made for deliveries three months or more ahead.

The barley trade received a fillip with a new export record of over 1 million tons. There was a gratifying decrease in the total imports of foreign grain and, with a greater use of home-grown barley by compounders, there appeared at last some positive evidence of the beneficial influence which forward contracting has had on the cereals market. It is virtually certain that the average Corn Returns price for barley in 1966/67 will be the second highest since 1958/59 and there are distinct signs that the wheat price will be the highest since 1956/57.

## The third scheme

When the scheme for 1967/68 came to be considered the Authority had a vast amount of statistical information and essential experience accumulated from the first two schemes to guide it. The minimum period of two months between the contract month and the delivery month had provided a firmer base for effective forward marketing, and therefore justified a continuance of this period. This consideration also applied to the principle of a differential rate of bonus for contracts entered into three months or more ahead.

On the other hand, the restricted rate of bonus fixed for November and December seemed to be a mistake as adequate supplies of grain for these two months were not encouraged; indeed a very small tonnage was registered for November delivery. The standard rate of bonus will, therefore, apply for these two months in the new scheme.

The use of Type B contracts was disappointing, being only 0·5 per cent of all contracts registered. The Authority considers that these contracts should provide flexibility within the scheme and, in order to encourage a greater use, the conditions attached to them have been relaxed. For instance, these contracts yield a flat rate bonus of 8*s.* per ton and the minimum tonnage has been reduced from 100 to 25 tons per contract.

It is important that the encouragement of a forward contract bonus should be sufficient to achieve the correct proportion of supplies on forward

contract. The previous trends had indicated a need to lessen the impetus to register forward contracts and achieve greater flexibility within the market through a better balance of supplies on forward contract as against supplies available on 'spot'; with this in mind, the rates of bonus have been reduced by 20 per cent.

## Its benefits and influences

It is now possible to make an informed assessment of the benefits and influences of forward contracting:

1. A substantial forward market has been stimulated as an alternative to the dominance of the spot market although possibly the correct balance has still to be found.
2. Many more growers are familiar with forward contracting and the advantages to be derived from it.
3. By planning forward marketing of their grain, growers are able to assure themselves of a pre-determined regular cash flow.
4. Growers are able to decide their marketing policies and put them into effect far sooner than was possible when the spot market was dominant.
5. Cereal growers as a whole are increasingly able to book their share of the total market several months ahead.
6. Merchants and users are assured of future supplies well ahead based on the discipline of registered forward contracts which the Authority considers necessary if British grain is increasingly to compete with forward contracted supplies of foreign grain.
7. This assurance of future supplies helps both to stimulate domestic demand for British grain and to take maximum advantage of the available export demand.
8. Increasingly, registered contracts are becoming recognized as useful documents of security for guarantees of loans, and the insistence of the Authority on the strict fulfilment of registered forward contracts is a strong influence in their recognition as documents of security.

## Looking forward

Prior to the introduction of the first Forward Contract Bonus Scheme, forward contracting was not a widely-used form of marketing for home-grown cereals.

Growers' marketing practices were mainly geared to the spot market and to spot decisions. Because of this, final users had not the same assurances of future continuity of supplies of home-grown grain as they had in the case of foreign grain. There were occasions when users turned to foreign grain because they provided assurances of future supplies well ahead. Having done this, users were then hesitant to revert to British grain with its less reliable future delivery. Under the Authority's Forward Contract Bonus Scheme, home-grown grain now competes on all fours with foreign grain in terms of assured future supplies. This is being reflected in increasing demands for the home product.

The Authority is satisfied that its Forward Contract Bonus Schemes, combined with the much greater fund of up-to-date and prompt market intelligence provided by its *Weekly Bulletin*, are a valuable aid to orderly marketing; that forward contracting is becoming established as an essential feature of the market and that the general character of future schemes is now taking shape.

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This article has been contributed by **W. J. Hazeldine** who is an official of the Home-Grown Cereals Authority. He was previously with the Ministry of Agriculture, Fisheries and Food as the Divisional Executive Officer in the Oxford Division.

# Why erect new farm buildings?

**Ralph Whitlock**

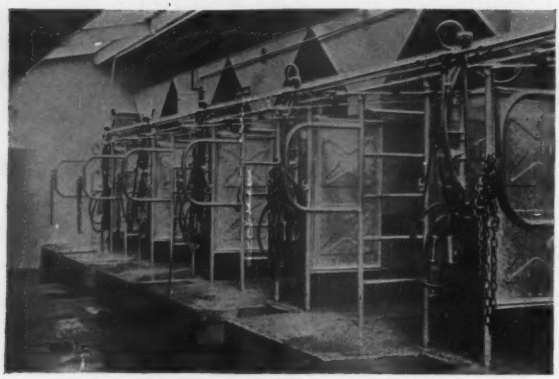
EMPHASIS on the type of new farm building in demand has changed quite dramatically in the past few years. For ten or fifteen years after the war needs of the big arable farms were the most urgent. When, with the intervention of the combine harvester, grain was no longer able to dry and mature in stack, new methods of drying and storing it had to be devised. For several years harvesting methods far outstripped drying and storage facilities, with the result that the grain market had a turbulent period, too much being unloaded on merchants at harvest-time. Now this has been rectified by most arable farmers either having constructed stores of their own or having access to co-operative stores, and grain-driers are available to suit even the smallest farmer.

Similarly, the intensification of the poultry industry is so far advanced that most of the broiler and laying houses needed have already been erected. A trend towards providing similar buildings for intensive beef and for pigs was severely checked by the difficult times experienced in the meat production industry last summer and autumn. In dairying, however, the pressure to provide new buildings is being steadily increased by the continual need for dairy units to become larger. Whereas only a few years ago we were looking ahead to the time when a one-man dairy unit would consist of forty or fifty cows, we are now thinking in terms of seventy to a hundred. At the Salisbury Farming Conference in January, Mr. G. W. Lugg, an agricultural consultant, claimed a herd of ideal size at 1,200 cows, in the charge of six dairymen who milked, two men at a time, in eight-hour shifts.

## Farm buildings visited

The Dorset Farm Buildings Week recently organized by the Agricultural Land Service illustrated another step in that direction. Of the nine farms selected for visits, seven had recently erected new buildings for dairying. Some had based their schemes on the adaptation of old buildings supplemented by new constructions, while some had started from scratch. All, however, were aiming at larger herds with less labour.

At Tomson Farm, Winterbourne Tomson, near Blandford, Messrs. M. Hooper and Sons, had the problems of a typical chalkland farm. Ribbon-shaped, it has a section of meadows by the stream and then a long, narrow strip of fields extending for a mile or two up to the downland plateau. As with almost all such farms, the buildings were traditionally situated by the stream, for the sake of the water supply, but the lay-out is most inconvenient for the modern utilization of the land.



*Rations are automatically conveyed to the milking parlour at Tomson Farm*

Messrs. Hooper have made a complete new start. Selecting a new site, more centrally placed on the farm, they have erected twin fodder barns and covered yards, with a high-moisture grain silo, a ration mixing room and a milking parlour to which the rations are automatically conveyed. In the covered yards 40 square feet are allowed per cow, and the loafing area is sufficiently wide to permit it to be used for feeding if an alternative to the present system of self-fed silage is required. The cows go straight from the loafing area into an assembly yard equipped with swing gates to allow for split herd management. A spreader standing beneath the dung disposal ramp collects the solid part of the effluent, while the liquid drains away into a tank. This is a two-man unit designed for 120 cows but capable of considerable expansion.

## Cowshed conversion

Messrs. Maitland Farmers Ltd., at Loop Farm, Lytchett Matravers, near Poole, had a useful existing double-range cowshed inadequate in size to accommodate a steadily-increasing dairy herd. Their solution was to convert the cowshed into a milking parlour and holding pen, the remainder being combined with an area of exterior concrete to form a partly-covered collecting yard. To this were added two covered yards and two fodder barns, each with a 40-foot span: 40 square feet per cow were allowed in the bedding area.

In 1965, before the scheme was launched, Messrs. Maitland were milking 60 cows, and the daily margin per cow was 33 pence. Now the herd, rapidly increasing, is over 75 and will eventually be about 120. The daily margin per cow in March of this year was 74·6 pence, and the labour cost per gallon was only 2·8 pence. Messrs. Maitland estimate that their profit margin has increased by about five times since the scheme was completed. The cost amounted to £70 per cow.

## Parlour and dairy

Lodge Farm, Evershot, near Dorchester, is a parkland farm, the old home farm of the Melbury Estate. Its owners, Strangways Estates Ltd., had the difficult problem of converting into a profitable dairy farm this hilly complex

of fields and trees on rather heavy soils with a range of buildings originally designed mainly as stables. As the new unit is almost entirely dairy, there was also a need to economize in straw.

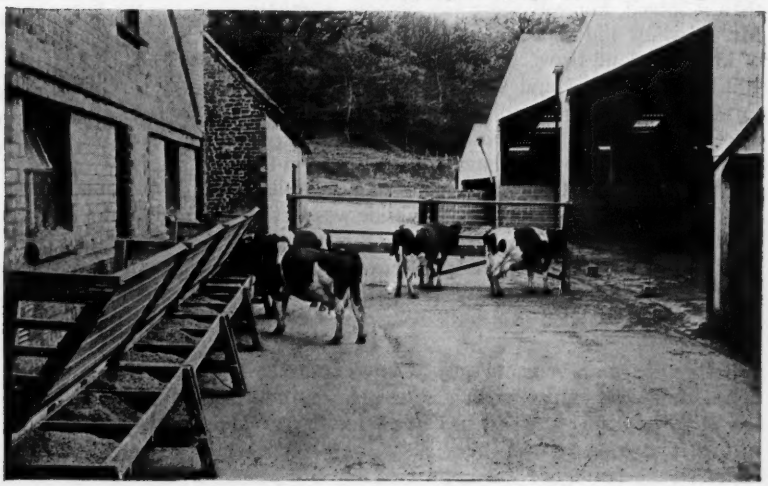
As at Loop Farm, the old range of buildings was transformed into parlour and dairy and a new set of buildings, in the form of covered yards and fodder barns, added. In this instance, however, the covered yards were equipped with cow cubicles, littered with sawdust. The cubicles are arranged in four rows, the central two facing each other without a dividing wall. Each cubicle is seven feet long by four feet wide and has an adjustable anti-fouling bar at the head, forcing the cow to step back when she rises and so drop her excrement in the passage. The buildings, concrete-framed and with the cubicles made of tubular steel rails, were constructed at a cost of £93 per cow (£65 net, after payment of grant). The parlour is an abreast one, and dung disposal is by means of economical scraping lines leading to a single ramp. Before the scheme was initiated, two men were milking 40 cows in the old buildings; now one man copes satisfactorily with 70.

## Portable bail

Two farms within a few miles of each other on the south Dorset coast have had to tackle similar problems but have chosen two very different methods. Mr. F. C. Woodhouse, of Manor Farm, Puncknowle, had a set of buildings on a restricted site in a corner of his 705-acre farm, remote from many of the pastures he wanted the cows to use. The existing covered yard was unsuitable for any purpose other than stock but did lend itself to replanning as a winter base for the dairy cows. A feed area with central double manger was provided, with arrangements for supplying it mechanically from new twin silos erected nearby. In this instance, straw was used for bedding, there being a plentiful supply on the farm.

Instead of a milking parlour, a herring-bone portable bail was chosen. In summer this is to be taken from the winter site to two supplementary

*Covered yards and fodder barns at Loop Farm*



*The new set of buildings at Lodge Farm*

bases selected with a view to allowing the grassland to be utilized in a proper rotation. The system thus has all the advantages of the portable bail, long-tested and vindicated on the southern downs, combined with those of a covered yard and the mechanized feeding of the winter ration. The net cost was about £66 per cow, and the scheme will enable Mr. Woodhouse to increase his dairy to 150/170 cows, under the management of two men.

## Double-span umbrella

Mr. E. J. Hawkins, of Shadrack Dairy Farm, Burton Bradstock, near Bridport, had an even worse problem of restricted space, for his house and buildings occupy a cramped site in the middle of the village. In front runs a busy road much used by holiday-makers (for the place is within a mile of the coast); at the rear a swift stream flowing through a fairly deep cutting separates the farmstead from its nearest pastures, which are reached by way of a narrow foot-bridge; and village houses crowd in on either side. Part of the farm consists of meadows by the stream, part of steep hillsides, and part of plateau land above the scarp.

Under these conditions, a portable bail would have created more problems than it solved, nor was there any obvious alternative site for the farmyard. Mr. Hawkins and his advisers therefore decided to make use of a small plot of low lying land between the existing farmyard and the stream. Only about 100 feet by 60 feet and surrounded on three sides by water, it presented formidable difficulties and offered only sufficient room for a bedding area, a feed area, a collecting yard and parlour. There was no space for fodder or litter store, all supplies having to be carted in from outside.

The building erected was a double-span umbrella building, 60 feet long and with two spans of 45 feet each. Alongside was just enough room for a 10-foot roadway, into which the feed area at times encroaches. One of the main difficulties was posed by the problem of effluent disposal. By agreement with the local River Authority, rainwater is piped direct to the river, while foul effluent is carried to a settlement tank from which it is carted away at intervals.

Before the improvements only 21 cows could be housed in the cowstalls, and milking and management were carried out under great difficulties. Now the herd has been increased to 74 cows, with less demands on labour than before. The gross cost has been just over £100 per cow. After grants were deducted the net figure was approximately £70 per cow.

## Beef production

Several other Dorset farms offered similar examples of improvement in milk production facilities, but mention must be made of the solitary farm investing in new buildings for beef production. Messrs. W. N. Chick and Sons of Compton Valence, near Dorchester, the owner-occupiers, have five farms in all, totalling about 3,500 acres, each of which has a dairy herd. The 800 or so beef animals living on the farms at any one time are largely the progeny of these dairy herds, or of culls and cross-breds originating from them, though some beef calves are purchased. Most of the calves are born between September and March, and the former practice was to see them through the following winter and then to sell them as beef stores. They spent the winter divided into four herds, one on each of four farms, on dry pastures. Each herd required the attentions for part of the day of a man with a tractor and trailer, and each winter at least one pasture on each farm was badly trodden.

By erecting a large, twin-span covered yard Messrs. Chick are now able to carry about 300 of the largest stores to beef weight in about the same time as was needed to produce strong stores under the old system. The cattle are housed in 16 pens each accommodating about 20 beasts and are fed with a concentrate and hay ration scattered along a central feeding and access passage. Instead of requiring the services of four men, one man can attend to all of them in just over an hour a day, and a considerable acreage of pasture is released for an early bite for the farms' sheep. The cost amounted to about £30 a head, less grant, but there is the additional factor that for half the year the buildings are available for other use. Messrs. Chick are intending to store machinery and house pigs in them during summer.

A feature of all the schemes visited is that the large umbrella buildings, nearly all double-span, are readily adaptable to other uses. Indeed, all have been planned with provision either for further expansion or for any possible change in farming policy that economic conditions may dictate. The farmers concerned have obviously been well-advised by the Agricultural Land Service, and the gratifying numbers of other farmers and landowners who came along to inspect the schemes were an indication of the value of organizing such a 'Farm Buildings Week'. Nevertheless, Mr. Brian Langmead's new venture at Selsey, in West Sussex, raises a doubt as to how long even these progressive schemes will remain up-to-date. For Mr. Langmead is establishing, and hopes to have in operation by the autumn, a dairy feedlot for 625 cows, on American lines—a project which seems to challenge even the most efficient 100-cow or 120-cow herd.

# Gross Margins on Hill Farms

**K. C. Yates**
*University of Manchester*

NET income taken from eighteen hill farms in north-east Lancashire declined from £1,606 per farm in 1964/65 to £1,533 per farm in 1965/66. As an annual fluctuation of only 4·6 per cent in net income on these farms can be considered small, advantage is taken of a comparatively static situation to estimate gross margins from the main livestock enterprises traditionally important in the region.

All the farms are located in the Bowland Forest area at between 500 and 1,800 feet above sea level and are subject to about 53 inches of rain per year. Haymaking is often tedious and prolonged. The farmsteads are surrounded by walled fields of permanent grass and beyond them lie extensive moorland stretches of heather, rushes, coarse grass and occasional bracken, on which most of the farmers have grazing rights. Much of the terrain is steep and broken up by a profusion of natural watercourses. The soil is thin and the millstone grit over which it lies sometimes protrudes.

## Land use and stocks

The enterprise common to all eighteen farms is the hill sheep flock, generally associated with the rearing of beef stores or Friesian dairy heifers on farms at the higher levels and with milk production on the lower lying farms, but there is no hard and fast rule. Particulars of land use and of stock carried under the two systems, selling and not selling milk, are:

**Table 1**

**Cropping per farm—Adjusted acres**

| | *Farms selling milk acres* | *Farms not selling milk acres* |
|---|---|---|
| Hay | 32 | 31 |
| Silage | 3 | — |
| Grazing | 86½ | 96 |
| Equiv. pasture acres rough and fell | 81½ | 94 |
| | 203 | 221 |

**Stocking per farm**

| | | *Farms selling milk* | | *Farms not selling milk* | |
|---|---|---|---|---|---|
| | | *No.* | *Livestock units* | *No.* | *Livestock units* |
| Cattle | Bulls | 1 | 45 | 1 | 33 |
| | Dairy cows | 21 | | 3 | |
| | Beef cows | 3 | | 12 | |
| | Other cattle | 42 | | 45 | |
| Sheep | Rams | 8 | 39 | 9 | 48 |
| | Ewes | 225 | | 277 | |
| | Hoggs | 76 | | 95 | |
| Poultry | Hens | 250 | 5 | 100 | 2 |
| | | | 89 | | 83 |
| Forage acres per grazing livestock unit | | | 2·4 | | 2·7 |

It is difficult to assess effective acreages but an attempt has been made to do this by assuming firstly that rough grazings are used to their full extent, and secondly that the pasture requirement of 8 Dalesbred sheep is 3 acres

per year. Thus if a farmer's right on a common fell is limited to a stint of 200 sheep, such grazing is estimated to be the equivalent of 75 pasture acres.

## The two systems

The economies of the two farming systems are summarized below, the actual figures which refer to 1965/1966, having been rounded off to the nearest £10:

**Table 2**

| *Per farm* | *Farms selling milk* £ | *Farms not selling milk* £ |
|---|---|---|
| Gross output | 7,030 | 3,830 |
| Total costs | 5,280 | 2,660 |
| Net farm income | 1,750 | 1,170 |

Whilst it may be of interest to know that the milk selling farms are more profitable than those which do not sell milk, this fact in itself is of little value to the individual farmer. He wishes to know how and to what extent he can improve his income, whether from the production of milk or from the rearing of cattle or sheep and in this respect he is poorly served by the kind and amount of data available for hill farms. Information on the farm itself seldom extends beyond an income and expenditure account and this is of limited use when the farmer or his adviser require information about specific enterprises. It is partly to offset some of these deficiencies that an attempt has been made to work out gross margins from such data as is available. A general indication as to the best allocation or fit of the variable costs has been derived from actual gross margin calculations for four of the farms concerned and the data thus obtained has been corroborated by the analysis of purchased feed on a further five farms. The apportionment of purchased feed, therefore, which accounts for 50 per cent of total costs and 70 per cent of the variable costs, is based upon the analysis of feedingstuff bills from a half of the farms surveyed.

## Farms selling milk

Estimated gross margins from the five livestock enterprises on the milk selling farms in 1965/66 are shown in Table 3:

**Table 3**

| | *Total* | *Dairy cows* | *Dairy replace-ments* | *Sheep* | *Pigs* | *Poultry* | *Misc. output* |
|---|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ | £ |
| **Gross output** | 7,030 | 3,380 | 1,510 | 1,410 | 30 | 650 | 50 |
| **Variable costs** | | | | | | | |
| Concentrates | 2,620 | 1,560 | 440 | 100 | 20 | 500 | |
| Agistment | 120 | | | 120 | | | |
| Fodder | 490 | 210 | 230 | 50 | | | |
| Veterinary, haulage, service fees, sundries | 240 | 80 | 40 | 120 | | | |
| Total variable costs | 3,470 | 1,850 | 710 | 390 | 20 | 500 | |
| **Gross margin** | 3,560 | 1,530 | 800 | 1,020 | 10 | 150 | 50 |
| Total fixed costs | 1,810 | | | | | | |
| Net farm income | 1,750 | | | | | | |

*Fixed cost assessed as follows:*

| | £ |
|---|---|
| Rent and rates | 280 |
| Labour | 600 |
| Power | 640 |
| Miscellaneous | 290 |
| | 1,810 |

Gross output of £3,380 from the dairy cows includes a charge of £1,080 for twelve calved heifers (£90 each) transferred into the milking herd from the dairy replacements which have been credited with a like amount. Dairy cows have benefited by £280 for the production of twenty-eight calves at £10 each and the dairy replacements have been charged likewise. Both the dairy cows and poultry have been given due credit for produce supplied to the household.

In 1965/66 the average milk yield per cow was 910 gallons worth £141, but the cost of getting such a high yield in terms of provender fed was high also. Bowland farmers appear to feed concentrates at the rate of 5½lb for every gallon produced, which at £33 per ton amounts to over £74 per cow. Total fodder costs were made up as follows:

**Table 4**

| | £ |
|---|---|
| Purchased hay and feed straw | 180 |
| Seeds | 10 |
| Fertilizers (net of subsidies) | 270 |
| Contract hay baling | 30 |
| | 490 |

The allocation of these variable costs presents a difficulty which is resolved here by apportioning them on a *forage acres per livestock unit* basis, though modified where a strict application of the rule is known to be incorrect.

The final gross margins shown in Table 3 can now be referred to either a livestock unit or acreage base as shown below. Because the acreage of land occupied by the different classes of livestock is estimated from the average number of livestock units in dairy cows, dairy replacements and sheep, the relationship between the computed *per acre* gross margins are the same relationships as for the *per livestock unit* gross margins, thus:

**Table 5**

| | *Dairy cows* | *Dairy replace-ments* | *Sheep* |
|---|---|---|---|
| Gross margin | £1,530 | 800 | 1,020 |
| Average number of livestock units | 21 | 24 | 39 |
| Gross margin per livestock unit | £72·9 | 33·3 | 26·2 |
| Estimated acreage occupied (2·4 acres per livestock unit) | 51 | 58 | 94 |
| Gross margin per estimated acre | £30·0 | 13·8 | 10·9 |

## Farms not selling milk

The calculation of the gross margins from the three livestock enterprises on the farms not selling milk is given in Table 6.

The pattern of cattle rearing varies on these farms, most of which lie at the higher altitudes. In some cases beef cows are kept, spring-born calves being sold off at the local suckler sales in the autumn; calves occasionally being bought-in for low-intensity multiple suckling. In other cases Friesian dairy heifers are bred, reared and sold after their first calving, making the system comparable to that of the rearing of dairy replacements on the milk selling farms mentioned earlier. In only a few instances have these upland farmers turned to intensive calf rearing, buying-in beasts at about a week old and selling again roughly fifteen weeks later. The gross margin from the cattle rearing enterprise therefore does not refer to any specific system, but serves only

**Table 6**

| | *Total* | *Cattle rearing* | *Sheep* | *Poultry* | *Misc. output* |
|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ |
| **Gross output** | 3,830 | 2,170 | 1,430 | 190 | 40 |
| **Variable costs** | | | | | |
| Concentrates | 970 | 730 | 80 | 160 | |
| Agistment | 70 | | 70 | | |
| Fodder costs | 230 | 160 | 70 | | |
| Veterinary, haulage, service fees, sundries | 190 | 60 | 130 | | |
| Total variable costs | 1,460 | 950 | 350 | 160 | |
| **Gross margin** | 2,370 | 1,220 | 1,080 | 30 | 40 |
| Total fixed costs | 1,200 | | | | |
| Net farm income | 1,170 | | | | |

*Fixed costs assessed as follows:*

| | £ |
|---|---|
| Rent and rates | 220 |
| Labour | 400 |
| Power | 450 |
| Miscellaneous | 130 |
| | 1,200 |

as a guide to the relative profitability of cattle rearing generally in comparison with sheep. The following Table shows the gross margins from the two main enterprises *stated in terms of per livestock unit and per acre:*

**Table 7**

| | *Cattle rearing* | *Sheep* |
|---|---|---|
| Gross margin | £1,220 | 1,080 |
| Average number of livestock units | 33 | 48 |
| Gross margin per livestock unit | £37·0 | 22·5 |
| Estimated acreage occupied (2·7 acres per livestock unit) | 90 | 131 |
| Gross margin per estimated acre | £13·6 | 8·2 |

## Unit gross margins

The estimated gross margins from all land occupying enterprises have so far been expressed as *per enterprise, per livestock unit* and *per estimated acre occupied.* Table 8 helps to state three of them in terms of the basic unit to which they refer.

**Table 8**

| | *Per dairy cow* | *Per ewe (farms selling milk)* | *Per ewe (farms not selling milk)* |
|---|---|---|---|
| | £ | £ | £ |
| **Gross output** | 161·0 | 6·2 | 5·2 |
| **Variable costs** | | | |
| Concentrates | 74·3 | 0·4 | 0·3 |
| Agistment | — | 0·6 | 0·3 |
| Fodder costs | 10·0 | 0·2 | 0·2 |
| Veterinary, haulage service fees, sundries | 3·8 | 0·5 | 0·5 |
| | 88·1 | 1·7 | 1·3 |
| **Gross margin** | 72·9 | 4·5 | 3·9 |

A gross output figure of £161 per cow is extremely high and needs a word of explanation. Dairy cattle in the area are almost entirely British Friesians. Bowland farmers specialize in the breeding of quality cows and regard this activity with as much importance as they do the production of milk. A number are pedigree breeders. The normal practice is to milk the young cow through one or sometimes two lactations and then sell it at a price which is not infrequently over £100. The output figure of £161 therefore

includes milk sales £140, the production of calves £12 and appreciation in value £8, the cow having been transferred into the herd at a value of £90 one or two years earlier.

It is impossible to express the dairy replacement and cattle rearing enterprises in unit form because both have been influenced to a certain extent by miscellaneous transactions which do not strictly conform to either of the descriptions given. The usefulness of their data shown in earlier tables is to explain their positions in existing farming patterns. It appears from Table 5 for example that on the milk selling farms dairy replacements have a gross margin that is rather less than half that of dairy cows, but a quarter as much again as sheep. On the farms that do not sell milk, cattle rearing has a gross margin over one and a half times that of sheep (Table 7). A feature of the calculations is that dairy replacements and cattle rearing on the two types of farm appear to be level pegging.

## Interpreting gross margins

The gross margins confirm that the production of milk even under the hardy hill conditions of north-east Lancashire is substantially more profitable than other land-occupying enterprises. One would therefore conclude that the more local farmers specialize in this particular activity to the exclusion of the others the higher will the farm profit become. However, it is necessary to keep the situation in perspective and to realize the limitations of gross margin analysis and interpretation within the context of these farms.

One of the factors assumed in calculating gross margins is that land is homogeneous. On many lowland farms the difference between one acre and another may not be sufficient to influence significantly the levels of enterprise gross margins. But the case is rather different on the hill farms described here. In Table 1 rough and fell grazings have been converted to an *equivalent grassland* acreage but this does not mean that Bowland farmers can expand their dairy herds until they have used up all the *equivalent grassland* available. Patently this could never be so. Dairy cows would barely exist on some of the rougher land where sheep thrive. But the flock does not live the whole year round on the moorland. Allowance must be made for the requirements of the sheep at lambing, shearing and tupping times. It is this seasonal demand which is in conflict with the needs of the dairy cows, although the total number of sheep kept may also be constrained by the carrying capacity of the fell during the rest of the year. The dairy followers are probably in somewhat greater competition with sheep on the rough land but the more critical question very often is to determine what proportion of dairy cows to followers should be kept, for it is these two categories that compete most strongly for the same land. Here the answer may depend not only on returns to land but also on returns to labour and other factors.

Most Bowland farmers know that the production of milk is more profitable than rearing either cattle or sheep, with the result that shippons are filled to capacity already. Further expansion of dairy herds would entail substantial additional investment in buildings, livestock and equipment. Of the eighteen farms here referred to four are owner occupied and fourteen tenanted. If this represents the general pattern of ownership in the area, most contemplated building improvements or alterations would have to have the consent of landlords who might not be willing to agree to their tenants' wishes. If they did agree the effect would be to increase farm rents, a fixed cost not taken

into account when estimating the gross margins, but which would certainly have to be taken into the reckoning if budgeting for a change in farm systems.

Indeed, all fixed costs, and particularly labour, would have to be considered in any major plan of reorganization. Manpower on most Bowland farms is supplied by the family and the position becomes critical when one member leaves or retires or when a school-leaver is ready to take up his expected place on the farm. An increase in cow numbers associated with a decrease in numbers of other stock would lead to an increased labour demand which it may not be possible to supply and the best way of utilizing labour resources must sometimes be by retaining the existing farm system. Generally where labour is plentiful and land in short supply it is more profitable to produce milk, but where land is plentiful and labour scarce it is more profitable to farm sheep. Just as the land and labour resources of most farms fall somewhere between the extremes of scarcity and plenty, so must the system optimum usually lie somewhere between milk production only and sheep farming only.

## Effecting economies

Fixed costs (i.e., rent, labour, power and some miscellaneous expenditure) amount to £8·9 per acre on the milk selling farms and £5·4 on the others. By their very nature they are items over which the farmer has little control and which through time have been increasing at a rate of about 5 per cent per year. If net incomes are to be maintained at their present levels, let alone increased, then fixed costs have to be covered year by year by increased gross margins.

Speaking generally Bowland farmers have no obvious means of doing this. Their systems, adjusted to local upland conditions, offer little room in which to manoeuvre and they are much in the hands of the local livestock markets. Economies can perhaps be effected here and there by:

1. care in feeding of concentrates which account for over 50 per cent of all costs,
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*Terrington Experimental Husbandry Farm*

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Sprays based exclusively on copper, usually as oxychloride, were employed in the earlier years of the trial series, and comparisons were made between high and low volume wet sprays and applications by dusting machine. In both bad and moderate blight years spraying gave useful increases in total and saleable ware yields. However, in those years where blight was slight, or did not develop at all, unsprayed plots outyielded sprayed plots, sometimes by a considerable margin. The net effect of spraying, taken over a number of years, was no better than leaving the crop unprotected. The losses associated with spraying arise from two main causes. Firstly, there is mechanical damage to the haulm and compaction of the ground caused

by the passage of the sprayer through the crop. This damage was measured by harvesting wheeled and unwheeled rows separately and it amounts to about half a ton per acre, taking the field as a whole, where a twelve-row sprayer had been used. Secondly, losses were caused by the toxic effect of copper on the potato. 'Copper shock' is now widely recognized and is particularly notable on haulm which has been growing rapidly. After treatment the leaves take on a hard, darker colour and growth suffers a considerable check. Copper will also accelerate the natural die-back of the haulm, particularly if it has already been damaged by aphid attack or gusty winds.

There was little difference between the results of high and low volume wet spraying but dusting gave more variable results. Dusters are still used in some districts because their lightness permits the use of a wide boom so that large areas can be treated quickly. Dusts are not as persistent as wet sprays which have dried on to the haulm, and must therefore be replaced more frequently.

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In 1958, which was a wet season with severe blight attack, a number of differently timed spray programmes were applied and the results obtained showed that some spray applications had been much more effective in controlling blight than others. The successful applications followed periods of moderate or heavy rainfall, when previous protective sprays would have been largely washed away, and when temperatures and humidities had usually fulfilled Beaumont conditions and encouraged rapid growth. Examination of weather records suggested that a total of 0·4 inches of rain falling in a period of five consecutive days might be used as the criterion to indicate the need to re-spray—following an initial application made on receipt of the blight warning for the district. This system was compared in succeeding years with routine spraying at intervals of 10–14 days. Using copper oxychloride as the fungicide over a five-year period, routine spraying produced the same average yield as the unsprayed controls, whereas rainfall controlled spraying gave a little over a ton more total yield. There were usually one or two fewer spray applications each season under the rainfall system than were required for the routine programme.

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Another aspect of blight control which has been examined is the time of burning-off in relation to foliage and tuber blight. In seasons of severe blight there must come a time when it is economic to burn off, because any further bulking will be offset by increases in tuber blight and the risk of increased rotting in the stored crop. In three seasons burning-off at the end of August has been compared with burning off both in middle and late September (or not burning off at all). In no case did foliage blight

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includes milk sales £140, the production of calves £12 and appreciation in value £8, the cow having been transferred into the herd at a value of £90 one or two years earlier.

It is impossible to express the dairy replacement and cattle rearing enterprises in unit form because both have been influenced to a certain extent by miscellaneous transactions which do not strictly conform to either of the descriptions given. The usefulness of their data shown in earlier tables is to explain their positions in existing farming patterns. It appears from Table 5 for example that on the milk selling farms dairy replacements have a gross margin that is rather less than half that of dairy cows, but a quarter as much again as sheep. On the farms that do not sell milk, cattle rearing has a gross margin over one and a half times that of sheep (Table 7). A feature of the calculations is that dairy replacements and cattle rearing on the two types of farm appear to be level pegging.

## Interpreting gross margins

The gross margins confirm that the production of milk even under the hardy hill conditions of north-east Lancashire is substantially more profitable than other land-occupying enterprises. One would therefore conclude that the more local farmers specialize in this particular activity to the exclusion of the others the higher will the farm profit become. However, it is necessary to keep the situation in perspective and to realize the limitations of gross margin analysis and interpretation within the context of these farms.

One of the factors assumed in calculating gross margins is that land is homogeneous. On many lowland farms the difference between one acre and another may not be sufficient to influence significantly the levels of enterprise gross margins. But the case is rather different on the hill farms described here. In Table 1 rough and fell grazings have been converted to an *equivalent grassland* acreage but this does not mean that Bowland farmers can expand their dairy herds until they have used up all the *equivalent grassland* available. Patently this could never be so. Dairy cows would barely exist on some of the rougher land where sheep thrive. But the flock does not live the whole year round on the moorland. Allowance must be made for the requirements of the sheep at lambing, shearing and tupping times. It is this seasonal demand which is in conflict with the needs of the dairy cows, although the total number of sheep kept may also be constrained by the carrying capacity of the fell during the rest of the year. The dairy followers are probably in somewhat greater competition with sheep on the rough land but the more critical question very often is to determine what proportion of dairy cows to followers should be kept, for it is these two categories that compete most strongly for the same land. Here the answer may depend not only on returns to land but also on returns to labour and other factors.

Most Bowland farmers know that the production of milk is more profitable than rearing either cattle or sheep, with the result that shippons are filled to capacity already. Further expansion of dairy herds would entail substantial additional investment in buildings, livestock and equipment. Of the eighteen farms here referred to four are owner occupied and fourteen tenanted. If this represents the general pattern of ownership in the area, most contemplated building improvements or alterations would have to have the consent of landlords who might not be willing to agree to their tenants' wishes. If they did agree the effect would be to increase farm rents, a fixed cost not taken

into account when estimating the gross margins, but which would certainly have to be taken into the reckoning if budgeting for a change in farm systems.

Indeed, all fixed costs, and particularly labour, would have to be considered in any major plan of reorganization. Manpower on most Bowland farms is supplied by the family and the position becomes critical when one member leaves or retires or when a school-leaver is ready to take up his expected place on the farm. An increase in cow numbers associated with a decrease in numbers of other stock would lead to an increased labour demand which it may not be possible to supply and the best way of utilizing labour resources must sometimes be by retaining the existing farm system. Generally where labour is plentiful and land in short supply it is more profitable to produce milk, but where land is plentiful and labour scarce it is more profitable to farm sheep. Just as the land and labour resources of most farms fall somewhere between the extremes of scarcity and plenty, so must the system optimum usually lie somewhere between milk production only and sheep farming only.

## Effecting economies

Fixed costs (i.e., rent, labour, power and some miscellaneous expenditure) amount to £8·9 per acre on the milk selling farms and £5·4 on the others. By their very nature they are items over which the farmer has little control and which through time have been increasing at a rate of about 5 per cent per year. If net incomes are to be maintained at their present levels, let alone increased, then fixed costs have to be covered year by year by increased gross margins.

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# Leisure in the Countryside — the landowner's point of view

**F. G. Holland**
**The Country Landowners' Association**

BRITAIN'S population at June, 1963 was 53·6 million and forecasters expect this figure to be increased by an additional 19 million by the turn of the twentieth century. Where are they to live and what will they do with their leisure time? The answer to the former question is to be determined by the planners, but in digest terms it means the construction of a town like Bristol (430,000) each year, or a 60–70 thousand peopled town every six weeks. But there will be 73 million people with leisure time to spend far in excess of that now enjoyed by our allegedly affluent society. Radio and television has awakened the minds of millions of people to new leisure occupations. Nearly every organized club for sport of one kind and another has waiting lists for membership. The facilities available fail to cope with the demands. But the 1967 man and woman is not, unlike his parents or grandparents, confined to very short journeys for leisure, e.g., to the town park or the local sports ground. In the course of one day his car can take him great distances to his favourite spot, for fishing, sailing, mountain climbing, nature study and what you will. His mobility has caused an invasion of the countryside for leisure and recreation. Motor cars, motorways and improved roads enable him to achieve these new ambitions, even though it is observed that our countrymen move, often at snail's pace, into town to work, but move faster out of it for their leisure.

## Multiple use

Leisure demands the use of land and of land covered by water. It is in respect of the latter use that considerable problems are likely to arise because water attracts people with widely differing interests. The man who sails, or has a speedboat, the waterskier, the fisherman, the canoeist, the caravaner and camper and the farmer, cannot, without accepting some form of control of their varying uses, achieve their aims. 'Multiple use' is all very well in theory. The term has been much used by conference speakers, but in practice it is found to be sadly wanting and wholly unrealistic. Without discipline and acceptance of the need for it, there can so easily be chaos and conflict. The Country Landowners' Association has formed a working party to consider this particular problem of water use, in consultation with fishery associations, other organizations and river authorities. But for these water uses there is no need for any control to be vested in officials. Landowners, sporting lessees and the organizations who make use of water have

managed, and can continue to manage, their affairs to their mutual satisfaction. There should be no fostering of the idea that 'authority' will provide and satisfy the demands. Coarse fishermen have built up the biggest national participant sport without any public money. They have found the water they require, paid their rents, cleansed and restocked the water, wherever required, and all this has been done by club members and their friends. The same has been achieved in many other sporting fields, and though private patronage, due to taxation, may not be as effective as it used to be, there is still scope for voluntary bodies to achieve their aims without seeking grant aid from public monies.

## Common land

There is said to be one-and-a-half million acres of common land in England and Wales. Much of it is remote from towns. It is primarily used for grazing hill sheep and cattle and in the shooting season, depending on weather conditions and management by the owner or sporting lessee, affords sport for grouse and rough shooters. Ramblers use common land as do fell and mountain climbers. In good weather the public have access to much of it for recreation or to park the car and admire the view. It has been said that the landowning people have always managed to fit their amusements into profitable land management. Whether that is in fact true it is an aim which should be striven for by all those who now seek to make use of our land resources, whether or not these are to be devoted in part to more sophisticated leisure uses.

## Land for recreation?

At long last it appears that some attention is now being paid to finding out what, where and how land and water could or should be devoted to leisure uses for sport or recreation. An assessment of demands for leisure is required. It should be undertaken at first on a county basis and suitably adapted to meet the anticipated regional demands, taking into account the mobility of the population within the particular region. This applies more particularly to land for recreation rather than sport, e.g., country parks such as are envisaged by the White Paper *Leisure in the Countryside, England and Wales* Cmnd. 2928. In this context it would be bad housekeeping to seek to change land now productively used for agriculture or forestry to that of a country park. First consideration should be given to the existing state and productivity of lands of least agricultural value. Common land and wastes of the manor, not already used for sport, e.g., golf, are by their very nature the type of land which calls for possible change of use to a country park or picnic site. These lands abound in Wales, the Peak District and the North of England. In Southern England many commons have for over 50 years or more been equipped for golf courses, cricket pitches and football grounds, and some have the added attraction of water which provides, as ever, a magnet for picnickers and coarse fishermen. Common land could, without great expense, be made into attractive country parks. Some planting of species of trees and shrubs which will thrive on acid soils, cutting of paths and rides for walking and horseback riding, some land drainage, a car park, and toilet facilities, are called for.

## Bearing the cost

I think that the Government should review policy decisions on this and many other aspects of financing the new realms and responsibilities of the Countryside Commission and its agent authorities. The White Paper categorically says there *will* be 75 per cent grant towards current expenditure and loan charges, both in respect of national parks and areas of outstanding natural beauty and in respect of what is proposed in the White Paper for the countryside generally, and for the additional administrative expenses of national park planning authorities involved in the creation of new facilities of improvement of the landscape. Local authorities do not take kindly to bearing the burden of 25 per cent of the costs of providing amenities and recreational facilities, the demands for which stem from pressures outside their areas. Some lesser financial burden could be imposed without detriment to the status of the park authority responsible for the day-to-day administration of the new park, picnic site and so on.

Sites to achieve all these will have to be found and money for the purchase or lease of them from the landowners and for the development of them. But landowners may well be found able and willing to act as partners in the particular enterprise. It is to be hoped the Countryside Commission Bill will enable agreements to be made between the authority and the landowners whereby the former provides capital for the development and the latter provides the land and manages it with existing or supplemented staff, on terms to be approved. This suggestion for active co-operation might allay the present fears of many owners that their estates were likely to be fragmented by the imposition of a country park within their midst.

## Conservation

Landowners recognize that there must be profound changes to accommodate the new demands. They would wish to lead in meeting the new challenges, but at the same time, justify the need for conserving the natural and man-made beauty of the countryside and, wherever possible, its peace. With their co-operation, long experience of rural land management, and detailed knowledge of the soils, land drainage, and so on, a far finer country park could be achieved.

*The views expressed in this article are those of the author and not the Ministry of Agriculture, Fisheries and Food or any other Government Department.*

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This article has been contributed by **F. G. Holland,** who is Legal Adviser to the Country Landowners' Association.

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## The Country Landowners' Association

### Diamond Jubilee

This year the Country Landowners' Association celebrates its Diamond Jubilee. It is sixty years from the time when a few 'influential' landowners met and formed the 'Central Land Association' to today's truly national organization representing, in fact, far more owner-occupiers than great landlords. Yet in that time, the C.L.A. has multiplied its first year's membership by a hundred.

*Pony trekking in the Lake District with pure-bred Fell ponies*

# Pony Breeding on the Hills

**Sydney Moorhouse**

IT has become almost commonplace to refer to Britain as the stock farm of the world, a claim based on the influence of our native breeds on studs, flocks, and herds in all corners of the globe. Recent years, however, have seen this status well maintained by the contribution made by our native ponies, which for centuries have been bred on the mountains and hills of these islands and built up reputations for both hardiness and soundness, as well as their ability to transmit their characteristics to their offspring. They have now added a virile overseas trade to the currently strong home demand.

## Shows and societies

Today, the value of these breeds is well recognized by the organizers of agricultural shows who find the classes for pony breeding stock and for the mountain and moorland ponies themselves becoming increasingly popular as the years go by. They do a great deal to fill the vacancies in schedules caused by the diminution in numbers of heavy horses and, in the case of the smaller events, of hunters. There are, however, two organizations which promote shows specially designed to reveal the growing importance of pony breeding in these islands. The older of the two, the National Pony Society,

holds its annual show at Malvern on August 3rd and 4th this year, while the younger but thriving and equally important Ponies of Britain Club, will be staging its 1967 major event at Peterborough on August 18th and 19th as well as a Scottish show at Kelso on July 28th. Each of these events have big displays, representative of all Britain's native breeds and their various crosses. They attract not only pony enthusiasts from all parts of the homeland but invariably bring interested buyers from abroad.

## Pony sales

Later in the year, of course, come the various pony sales where the demand invariably exceeds the supply. This thriving pony trade is a natural adjunct to the growing interest in riding as a hobby, particularly among young people who at one time lacked the opportunity, as well as the means, to indulge in a pastime once regarded as the prerogative of the few. Stimulated by the big international successes of our leading riders in the Olympic and other show jumping and combined training championships, enthusiasm has grown so much that the riding school is an accepted part of every locality. Pony-trekking, too, has become a popular way of spending holidays and the number of establishments providing facilities has increased considerably over the last few years.

All this, of course, places a commercial value on pony breeding and many hill farmers have turned to it as a means of providing additional income, and at the same time increasing profitable stocking without over-much interference with the normal tasks attendant on the keeping of flocks of mountain sheep or herds of hill cattle.

One of the chief advantages is, of course, that the hardy native breeds are virtually self-supporting and often enough thrive best on the very type of grazing unsuited for other stock and hardly worth the cost of reclaiming or even re-seeding. Indeed, many breeders claim that hill ponies perform a useful service to other stock by trampling down bracken. I well recall that when attending a bracken eradication demonstration in North Wales some years ago I was told that during the times when the Welsh hills carried far greater stocks of ponies than is the case today, the menace was almost unknown: the sharp hooves of the animals cut the stems of the pest and kept it under control.

## Welsh breeds

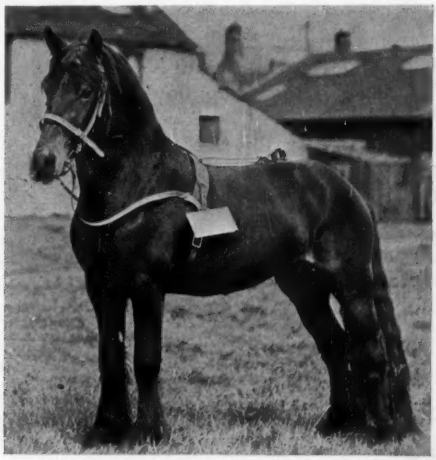
The two native Welsh breeds, the Welsh and the smaller Welsh Mountain, have perhaps made the greatest contributions to the evolution of the modern riding pony, and, indeed, throughout the whole of the show season it is impossible not to notice the predominance of Welsh blood whenever children's riding ponies are being judged. This, of course, suggests that the breeding of Welsh ponies on the hills bears a close connection with sheep rearing, the pure-bred upland stock being the reservoir that provides the nucleus of the more utilitarian crosses. It is, therefore, hardly surprising that two of the leading breeders of Welsh pony stock, H. Llewelyn Richards and R. J. Richards, whose family name is indelibly linked with that of the Criban herds, are also highly successful sheep farmers. In addition to their ponies, they have extensive flocks of Cheviot × Welsh Mountain sheep on the slopes of the Brecon Beacons, above the Taf Fechan valley. Both brothers are in great demand to judge ponies in the summer months and 'R.J.' also

officiates in a similar capacity at sheepdog trials, having judged the international championships two summers ago.

The Richards family have been farming lands in this vicinity for nearly three hundred years. There is a record of one Howell ap Richard being born at Cood Hir, one of their three holdings, in 1697 and it has been suggested that he laid down the foundations of the present herd in the ponies he bred for hunting and shepherding. For many years, the family home was at Abercriban—hence the name of the herd. When that was acquired for a reservoir, however, and the surrounding slopes planted with trees, the remaining grazings consisted of land above the 1,200 ft contour and stretching up to the ridge at close upon 3,000 ft. With the change came a ban on the keeping of hill cattle, and since then the ponies and sheep have held possession of the uplands.

Some years ago, when the father (himself a founder member of the Welsh Mountain pony stud book) retired, the Criban herd was divided among his three sons, Llewelyn taking one which retained the original name, 'R.J.' maintaining the Criban (R), and the late Bill Richards the Cui. Today, each of the three remains, each comprising some 30 mares and a couple of stallions, on adjacent hill lands. Criban stock has not only been exported to all countries of the world but also won many awards in the overseas show rings, including the coveted championships at New York and Toronto, the two biggest exhibitions of ponies on the west side of the Atlantic.

In the northern section of the Principality, the most famous herd is unquestionably the Coed Coch, established by the late Miss M. Brodrick at Plas Llewelyn, near Abergale, in 1924 and now maintained successfully by Lt. Col. E. W. Williams-Wynn. Here again there has been a big overseas trade, with Coed Coch taking major awards in North America and elsewhere. For over thirty years, the Coed Coch ponies shared their grazings on the Denbighshire hills with Welsh Mountain sheep and Black Welsh cattle. Early in the war years, the late Miss Brodrick had some of the rougher land ploughed and re-claimed and she told me that she considered the controlled grazing of mixed stock to be ideal for land of this type, the sheep preferring the grass to be short, while the cattle and ponies preferred it longer. 'There is nothing better than ponies for pulling up old feg or cleaning up scutch grass on stubbles' she told me.



*A championship winner at the Fell Pony Society Show at Penrith*

## Dales and Fell

On the uplands of the Pennines, the Lakeland fells, and the heights of Northumberland, two other ancient breeds hold sway. These are the Fell and the Dales ponies, both of which have an origin in the dark, shaggy little ponies that thrived on both sides of the Scottish Border and are usually referred to as Galloways in early records. Today the Dales is mainly found on the east side of the Pennines and the Fell in and about the Lake District, but size and not geographical distribution is the real distinction between the two, the Dales being up to 14·2 h.h., while the Fell should not exceed 14 h.h. and is generally in the vicinity of 13·2 h.h.

Mr. Peter A. Lawson, who farms 117 acres of marginal land at Cleveland House, Hutton Gate, Guisborough, is the present Hon. Secretary of the Dales Pony Society. In his opinion a hill pony is a 'must'. He says many more would be used if we suffered the severe winters every year of America and Canada. In the 1947 winter the hill ponies were the only means—apart from helicopters—of getting hay to sheep and keeping ewes on the move. A tractor costs about £800 and is worth £150 less as soon as you drive it away from the engineers' lorry. A Dales or Fell pony costs between £80 and £150 at four years of age and its value, like that of a sheepdog, increases with use. A brood mare costs the same and a foal each year is worth between £40 and £75 at weaning time, depending on whether it is a colt or a filly.

One of the staunchest advocates of the Dales' breed is Mr. J. W. Dalton, who until his retirement two years ago, kept five or six brood mares and one stallion on his 190 acres farm situated 1,200 feet up on the Durham Pennines. They shared the grazings with about 50 head of Shorthorn cattle and between 300 and 400 sheep. He still retains three pony mares. Others who keep Dales on the Northern hills are Messrs. W. W. Wilkinson and Sons, J. R. Longstaff, and R. Ridley, all of whom are in the Swaledale area of Yorkshire, and Mr. and Mrs. Harrison who combine pony breeding with farming on the north-east Yorkshire moors above Rosedale.

On the Cumberland fells, one of the most famous herd of Fell ponies is the Guards, which Mr. R. Little maintains on the uplands above Ireby and which have the use of a tract of common on which he also grazes a Galloway suckler herd and hill sheep. The Hon. Secretary of the breed society, Miss Peggy Crossland, runs her Packway ponies on some very rough land near Windermere, where she finds they do a great deal towards eradicating creeping thistles. In Northumberland, too, Mrs. G. F. S. Newall has her Fell ponies running with Galloway blue-grey cattle and mule ewes at Todridge, 700 feet up on the north side of the Tyne valley at Great Whittington.

It is, indeed, this successful combination of pony breeding with other forms of hill farming that has resulted in their current healthy state, as can be well seen by a visit to the pony rings at any of the summer shows.

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**Sydney Moorhouse, F.R.G.S., F.Z.S.,** is an agricultural journalist and broadcaster. He is specially interested in equestrian events and sheepdog trials, and being interested in country life has written a number of books on rural subjects.

# Efficient Vegetable Production on the Wirral

A. F. Hendy

THE small vegetable holding is considered by many to be in a particularly vulnerable position to competition from developing large and highly mechanized production units. Considerable changes, however, have taken place over the past few years and marked improvements in efficiency are increasingly evident on the intensive holdings of the Wirral peninsula.

## The bed system

Vegetable and salad production in Cheshire is carried out mainly on small holdings, the majority of which are under 15 acres. These are confined within three basic areas: the southern fringe of the Manchester conurbation, the Dee river valley of Farndon and the Wirral peninsula. Each area has its own cropping characteristics but the most important is the Wirral, in particular the coastal strip from Heswall to Wallasey where several concentrations of holdings are established on blown sand, mostly very close to the sea. It is on these holdings that early and highly intensive cropping is carried out on light, easily-worked sands, which contain high levels of organic matter from continued heavy applications of manure. Some holdings in this area would be covered by the tide if it were not for the sea wall, and it is not surprising therefore that much of the land has a high-water table. Whilst irrigation is seldom required, even during very dry periods, it is through the winter months that surface water becomes a problem and it was mainly for improved drainage particularly with standing crops, that the bed system became an established tradition. In the past the beds were prepared by hand but now this is almost entirely done mechanically. A wide range of equipment including rollers and crop markers are made to fit the bed system. This remains a favoured method of cropping because it is found to be ideally suited to modern techniques also because land of this type is becoming increasingly scarce due to development.

Because of the very exposed nature of holdings on the coast an intricate system of hedges has been established to break the force of the wind and prevent the devastating effects of sand blasting. Privet is used almost exclusively and many mature hedges are over ten feet in height. Poplar and thorn have not been very satisfactory, particularly where exposure is severe and one grower is looking at the possibility of Escallonia which is so useful

*Self blanching celery grown on many holdings. This is a high cash value crop*

for this purpose in Cornwall. Most of the fields in the past were small and although many remain, there is a tendency to remove hedges to give larger fields for mechanized cultivations.

Cheshire growers generally enjoy certain natural advantages not least of which being the close proximity of large centres of population and important wholesale markets.

Wirral growers particularly have the advantage of early production: glass-raised transplanted lettuce is commonly cut by end of May, outdoor radish bunched in early April and spring-sown salad onions by the end of May to early June. Weather permitting, spring greens are harvested from mid-August through to May and often a flat of ground will produce two successive cabbage crops within this period.

Vegetable crops most widely grown on the Wirral are spring cabbage, leeks, cauliflower, bunched beetroot, carrots, turnips, rhubarb, lettuce, salad onions, radish and self-blanching celery. In recent years marked changes have taken place in the production of these crops, most important being the widely adopted use of chemical weed control, mechanical planting and precision placement of seed. Also of importance is the use of improved vegetable varieties, up-to-date methods of pest and disease control, the scientific application of manures and fertilizers and a healthy co-operation and exchange of knowledge between growers.

## Chemical weed control

There can be no doubt that the introduction and skilful use of residual, translocated and contact herbicides, has been the greatest single factor influencing efficiency of vegetables and salad production. One wonders in fact what pattern would be emerging now had the present range of specific herbicides not been available. Weed seed populations on most established market gardens are astronomically high and the amount of hand labour which was involved in the past is not now available, nor would the economics of some of the crops grown allow its use. Weed spectrums are usually quite

wide but the most common and pernicious species found are invariably annual nettle and chickweed, closely followed by groundsel, annual grass, polygonum and matricaria species.

It is not always appreciated that the use of modern herbicides requires a greater accuracy and finesse of operation than most vegetable growers have previously had to apply; the difficulties of accurately applying 4 oz of active ingredient per acre, particularly for the first time, are not inconsiderable. However, once the grower is accustomed to relating quantity of herbicide to area of land and the spraying appliance is accurately calibrated, the most important lessons have been learned. Very often the grower's first experience of residual herbicide has been the use of chlorpropham or proprietary mixtures containing this chemical, in lettuce, salad onion or leek crops. This herbicide was introduced many years ago and as it gave such excellent control of annual nettle and chickweed on Wirral soils at quite low application rates, very dramatic effects were seen, inspiring enthusiasm and confidence in the use of the more specific chemicals to follow. A wide range of approved chemicals are now commonly used and there is not one crop of importance in which some herbicide cannot be used; sometimes the grower has a choice from which to select, to suit his particular requirements.

One natural advantage which an established market garden often enjoys is that the soil organic status can be much higher than where large acreages are cropped on extensive rotations. This invariably affects the margin of safety in the application of chemicals for weed control and the grower who knows his land has considerably greater scope, not only in the quantity of material which can be applied but also in the chemical type.

Many informed growers, having a good understanding of their soil, are successfully using herbicides within a very narrow margin of safety. An excellent example of this is the use of chlorpropham as a pre-emergence spray in radish crops. Although brassicas generally do not like this chemical, under certain conditions of soil and management, it can be used at rates approaching $\frac{1}{4}$ lb active ingredient per acre without crop damage. The particular benefit in this instance is that annual nettle is controlled. Although with good growing conditions radish will be harvested three weeks from sowing, the growth rate of nettle is equally rapid, making the task of pulling and bunching, without the use of herbicides, both difficult and unpleasant.

*Low rates of Simazine used in spring for control of winter cabbage. Bed on right has not been planted or sprayed*

Similarly, prometryne is applied overall following the transplanting of leeks giving complete weed control up to harvesting, whilst more recently very low rates of simazine are being used commercially for weed control in leeks, cabbage and cauliflower. This does not mean of course that mechanical cultivations for weed control are not still practised; in some circumstances they remain the cheapest method of keeping a crop clean, but chemical weed control is fast becoming an exact science and will continue to be of increasing importance in the future.

## Mechanical planting

Mechanical planting of vegetables has been practised for a long time, although on the small, intensive holding the use of available equipment has been rather limited. In more recent years highly sophisticated planting machines have come on to the market which are eminently suitable for close planting even where production is carried out on the bed system. To some extent the value of these planting machines has been increased by the introduction of efficient herbicides and a greater knowledge of optimum plant spacings.

Lettuce, leeks, cabbage and other vegetables are mechanically planted with great precision. Leeks for example can be planted at just over 3 in. in the row at a planting rate approaching 3,000 per operator/hour, whilst lettuce, always a difficult subject in this respect, can be transplanted without damage and at the correct depth.

## Seed placement

Precision seed placement and space sowing of many crops is now possible with the use of special seed spacing drills. Several distinct drill types are available and the final choice rests with crop type, cropping system, soil type and personal preference. It would seem, however, that on the smaller production unit the most widely favoured drill is that using changeable rubber belts into which holes varying in number and size are punched to give the crop spacing required. As with planting machines, the introduction of efficient herbicides has greatly enhanced the use to which such equipment can be put.

Certain seed types cannot be accurately drilled due to their difficult shape. Lettuce is an example and in this case the individual seeds are encased within a pellet which can then be very accurately spaced at sowing. Growers use a variety of spacings, but the more common is two seeds, 1 in. to 2 in. apart, every 9 in. in the row. It is fair to say, however, that with this particular crop growers hold different views and it seems that, in the case of precision drilling of pelleted lettuce seed, a grower's temperament is the decisive factor. Where the method is being successfully employed growers are particularly satisfied and feel that, apart from saving in labour, the actual crop at harvesting is improved over the transplanted crop. Using a four-drill unit with rows at 10 in. centres, one man can sow an acre of lettuce in two hours. The cost of pelleted seed is in the region of £13 per acre.

With other crops, nature has endowed the seed with a more convenient shape and space sowing of cabbage, radish, turnip, onion and leeks, without

pelleting, is regularly practised on an increasing number of holdings. Specially graded or prepared seed is available for some of these crops, contributing to greater accuracy and less waste. With radish and salad onions some growers are using a special belt containing three distinct rows of holes. The advantage is that instead of seed being placed into a single row, the same quantity of seed is spread more evenly over a narrow band of just over 1 in. Subsequent crop growth is more uniform and very little grading is required at harvesting time, increasing crop yield and quality and reducing the time taken in bunching. For cabbage and leek plant raising a belt having two rows of holes is used, giving improved uniformity and producing better transplants of very even quality. On holdings where labour is more limited than land, cabbage, cauliflower and leeks are being space-drilled into their final positions.

## The future?

Prediction of the future is often a question of luck and in this case many of the factors which will be influencing efficiency of cropping and market stability cannot be foreseen. It would seem, however, that provided the grower continues thoughtfully to apply scientific knowledge and experience to the requirements of cropping the land, he has little to fear, particularly when he is placed on the consumers' doorstep. With many growers in an area producing the same crops to similar standards, possibly the next step lies in co-operative marketing. One thing, however, is certain, whatever the next development—it will be interesting!

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This article has been contributed by **A. F. Hendy, N.D.H.,** who is Horticultural Adviser in the National Agricultural Advisory Service.

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## Agricultural Engineering Symposium

THE Institution of Agricultural Engineers will hold its Agricultural Engineering Symposium at the National College of Agricultural Engineering, Silsoe, Bedford, from 11th to 14th September 1967, assembling on Monday evening and dispersing Thursday midday.

At this first event of its kind to be held in Britain nearly fifty papers will be given, ranging over a broad spectrum of agricultural engineering technology in the world of today.

Particulars regarding residential facilities may be obtained from the Honorary Secretary, The Institute of Agricultural Engineers, Penn Place, Rickmansworth, Herts.

Brian G. Williams

# Single-Suckler Herds

## A Survey in Norfolk

SINCE the inception of the 'Norfolk Four Course', beef cattle have been part of the arable system, summering on grass and wintering on by-products. Even now, more than a fifth of Norfolk is in grass, with a third in ley and two-thirds in permanent grass ranging from well sheltered parkland to poor salt marshes. For winter feed there is grain, hay, herbage seed and cereal straw, pea haulm silage, potatoes, carrots, sugar beet tops and plenty of vegetable by-products. However, many of the feeding yards now house fertilizers and farm machinery. During the winter of 1964–5, 600 cattle of varying types were weighed and feed recorded to obtain information on current practices. In this investigation the single-suckled calves made disappointing progress. They finished at lightweights and had a tendency to be over fat. They were mostly of beef type, heavily fed and seemed too young and small for feeding.

This observation started an inquiry into suckler herds in the county. Farmers with more than 20 beef cows were asked seven questions in a postal survey, i.e., the number and breed of cow and bull, time of calving, calf outlet and whether the farmer would discuss his enterprise in more detail with the N.A.A.S. The response was good. Seventy-nine per cent of the questionnaires were returned, 12 per cent had sold their herds and some 80 farmers agreed to discuss in more detail. These discussions enabled more physical and financial details to be obtained.

The survey covered approximately half the 11,000 cows in the county, which in itself suggested that the majority of herds were under 20 cows.

Superficially, herds may seem similar in type and management, but the survey showed a surprising diversity. Most were of mixed or cross-bred cows. Indeed, there were thirteen breeds mentioned either pure or as parents of cross-bred cows and nine breeds of bull. Half the farmers sold their calves fat, a third as stores and the remainder a proportion of each.

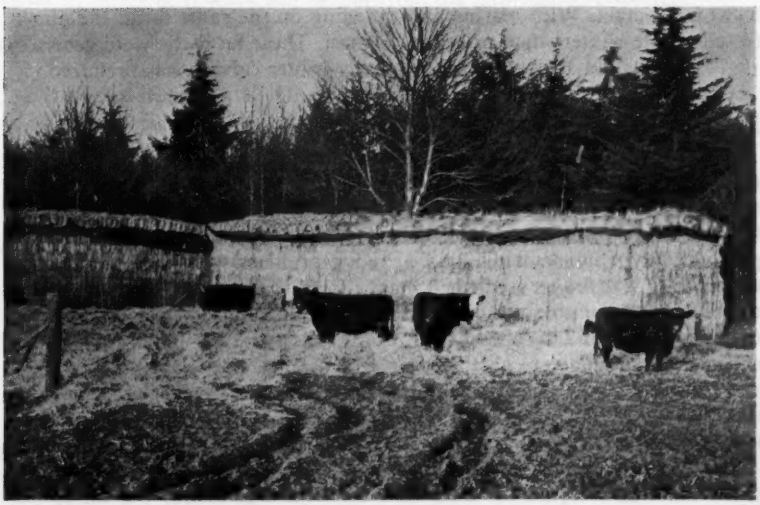
## Financial information

The financial returns were expressed as gross margin per cow (including forage) for herd comparisons. This avoided the difficulty of apportioning overhead costs, but did not provide an ultimate profit figure. The benefit of grass in the light land rotation for subsequent arable cropping was not assessed. The land was so variable, viz., heavy clay, unploughable banks and salt marshes, that any comparison of gross margins per acre was not valid. Half the farmers could provide reliable financial information for the previous year. These were divided into farms selling stores or where the suckler herd could be separated financially from the fattening enterprise, and where the calves were fattened on the farm and figures were only available for the whole of the process. The average gross margin per cow for store producers was £33 (range £5–£47) and for rearing and fattening £43 (range £21–£70).

## Type of stock

Most herds had several breeds or crosses of cow but with the variations in management it was not possible to identify 'a most profitable type'. In the past the Blue-Grey had been popular and mated to a beef bull the heifers were often kept as replacements, but during the last two or three years the Hereford × Friesian cow had gained in popularity.

*Straw bale shelter for suckler cows and calves outwintered by E. M. Dewing at Red Hall Farm, Beeston St. Andrews Nr. Norwich during January 1967*



It was not possible to compare returns from different breeds of bull, though most store raisers felt a white face added value to the calf and nine out of ten used a Hereford bull. The Hereford was still the most popular on farms where the calves were sold fat, siring 57 per cent, Aberdeen Angus sired 33 per cent and others 9 per cent. Amongst the 9 per cent were the Lincoln Red, Beef Shorthorn, Galloway, Sussex, Friesian and South Devon. Charolais cross calves had done well with no reports of calving troubles. There could be more interest in this breed when bulls are available to the commercial beef producer.

Longevity is a feature of the suckler cow, and these herds seem to average about eight years breeding life with an annual depreciation of £2–£4 varying with the buoyancy of the barren cow trade. Half the farmers used their own heifers as herd replacements, and the rest either purchased or reared beef crosses from the dairy herd. Bulls had an average working life of six years, though some lasted up to ten years.

## Calving date

Ideally, the cow should, once a year, produce a living calf, and it should grow and fatten quickly. In the survey the average was 3·5 per cent barreners and 4·7 per cent calf loss. On both counts winter calvers were rather worse than average and all the year round calving herds had a high calf loss, suggesting a lack of supervision. Particularly if there is no full-time stockman, it is better to calve over a short period so that there can be adequate supervision. Most bulls were allowed to run with the cows for long periods, but some of the more successful herds were only mated for about nine weeks to contract the calving period and produce a more even bunch of calves.

In the hill and marginal areas generally, calving dates have moved from spring towards the preceding autumn, producing a stronger, almost yearling calf for the autumn sales. This lowland survey found a similar calving trend but the calves were sold both in spring and autumn. Ideally, calving should be related to the date of sale; autumn and early-winter born calves sold in autumn and spring born ones at the spring sales; they should be at least 6 cwt live weight. With rearing and fattening on the same farm, the aim is to sell in late winter when prices are highest. These fat cattle were generally 16–18 months old so that autumn or early-winter calving was preferred.

## Feeding

Animal by-products were an essential part. Ninety per cent of the farms used straw together with a succulent so that few herds were fed entirely on dry foods. There was little information on quantities of bulk feed but the amount of cereal and high protein feeds ranged from nothing to 10 cwt per cow. Hypomagnesaemia was a major problem, so that much of the concentrate was fed as a calcined magnesite carrier supplying 2 ounces per day during susceptible periods. It was commonly mixed in a daily ration of 1 lb wet pulp or 2 lb rolled barley. Sugar beet pulp nuts already containing calcined magnesite were also used at 4 lb per head per day, but some felt this quantity was expensive. Urea supplements were fed along with straw in a few herds but summer stocking rates had to be increased to justify the extra feed cost.

Farmers who were creep feeding the calves, found that the increased sale prices more than repaid the extra cost. The feed was usually purchased but

a palatable home mixed low protein ration could have been used. Creep feed consumption varied from ½ to 4 cwt per calf. It was difficult to judge the correct level of feeding but some autumn born calves were fed throughout the winter. Experience showed that in summer, the calves normally ignored creep feeds until the midsummer grass shortage. Feeding in this period minimized any weaning check.

## Results

Farmers in the survey were invited to discuss the results in small group meetings. The interest in the survey and the meetings showed the concern for making more profit from suckler cows. Poor returns were a symptom of low output levels coupled with high costs. Low output usually meant calves were sold at lightweights, as stores or fat. There were instances of calves of 4 cwt live weight beginning their feeding period when there was not a big enough frame to put the flesh on! A fat calf at 6½ cwt is a poor return for one year's breeding.

The major factor of high costs was too many concentrates. Creep feeding was an investment but amounts of concentrates for a cow should be restricted, if possible, to a calcined magnesite carrier.

Fertilizer costs per cow were high in a few herds, even though the rate per acre was reasonable. This emphasized a need for more stock and better grassland management. In the results the herds were grouped according to to the level of gross margin per cow. Table 2 shows a fall in gross margin as a combination of two factors. The gross output decreases and the costs increase. Table 1 gives a similar picture but points to the need for greater managerial control.

Most herds could leave more money in the farmer's pocket. Attention should focus on contracting the calving period and relating it to the time of sale, restricting the amount of concentrates fed to the cow, intensifying the stocking rate, creep feeding calves and selling them at appropriate weights.

This survey has been a stimulus to keep more exact data. It is hoped that results in subsequent years will benefit from the information collected.

**Table 1**

**Store Producers**

| Level of gross margin/cow | £40+ | £35–£39 | £25–£34 | £15–£25 | Below £15 |
|---|---|---|---|---|---|
| Number of herds | 6 | 5 | 7 | 5 | 3 |
| Gross output/cow | 58·2 | 59·8 | 44·0 | 43·0 | 38·0 |
| Direct costs/cow | 9·3 | 13·4 | 4·8 | 13·5 | 14·8 |
| Direct costs of forage/cow | 5·9 | 8·4 | 9·2 | 6·3 | 13·2 |
| Gross margin/cow | 43·0 | 38·0 | 30·0 | 23·2 | 10·0 |

**Table 2**

**Fatteners**

| Level of gross margin/cow | £50+ | £30–£49 | Below £30 |
|---|---|---|---|
| Number of herds | 4 | 4 | 4 |
| Gross output/cow | 82·8 | 77·9 | 61·8 |
| Direct costs/cow | 17·1 | 28·9 | 32·3 |
| Direct costs of forage/cow | 7·1 | 4·6 | 3·8 |
| Gross margin/cow | 58·6 | 44·4 | 25·7 |

This article has been contributed by **Brian G. Williams, N.D.A.,** who is Livestock Husbandry Adviser for the National Agricultural Advisory Service in Norfolk. He was at Bridget's Experimental Husbandry Farm before taking up his present appointment.

# 1. The Isle of Anglesey

**R. D. Williams** *Deputy County Agricultural Adviser, Llangefni*

THE County of Anglesey is unique in that it includes two islands—the main island and Holy Island on which Holyhead is situated. It is connected to the mainland by road over the Menai Suspension Bridge, and by rail through the Tubular Bridge on the London to Holyhead main railway line.

Throughout the ages Anglesey has been referred to as 'Môn Mam Cymru'—(Anglesey the mother of Wales) illustrating its renown for agricultural production at all times.

Generally the land is fertile and easy to work and, in marked contrast to much of Wales, the ratio of crops and grass to rough grazing is high. Climatic conditions are ideal in many respects. Although the whole area is rather windswept the influence of the Gulf Stream avoids wide fluctuations of temperature and maintains a reasonable rainfall. Farmers are able to choose from many alternative enterprises; one often finds many systems of farming practised in the same parish. A change from one system to another as economic circumstances dictate is possible, whereas the hill conditions in many Welsh counties severely restrict the choice of enterprise. Beef, sheep and dairy production are the major grass enterprises, while early potatoes and cereals are the main arable crops of the County.

## Tradition

By tradition and inclination the Anglesey farmer is basically a meat producer. All the exported animals are a finished product but have to withstand the disadvantage of a long haul to markets in the consuming centres of the Midlands and London.

Large numbers of store cattle are imported from the mainland and Eire. Snowdonia forms a convenient reservoir for the requirements in draft ewes and store lambs.

Finishing of animals on grass is the main method of fattening. In beef production, however, one sees all combinations of methods including rearing to finishing point on the same farm and occasionally a herd of single suckling cows is maintained.

With the exception of a few Wiltshire Horn and Suffolk sheep flocks, kept for the production of crossing rams, little sheep breeding takes place on the island. Draft Welsh ewes from the adjoining hills are bought and are crossed with Suffolk and Wiltshire Tups for the production of fat lambs. In recent years the number of Welsh half-bred ewes kept for the same purpose has increased.

Producers take pride in the quality of their grassland and many of the best fattening pastures are capable of fattening three lots of cattle in a grazing season. Great emphasis is laid on a winter rest and early stocking in the spring

*The Jones Brothers of Plas Llandegfan, Menai Bridge*

with suitable animals. The grass is allowed to grow to the cattle, never vice versa.

The fact that once the war-time ploughing compulsion was removed the acreage under the plough fell back to 1939 level, at which it remains, illustrates the great reliance placed upon grassland. Pastures are renewed normally by a direct reseed, the system having developed into an established practice. Good seeds and a suitable liming and fertilizing treatment are used.

## Structure

Sixty per cent of Anglesey is farmed in units of less than 100 acres. Of the 3,250 holdings only 350 are over 100 acres. Amalgamation has, however, been proceeding steadily and there are a thousand fewer holdings on the island now compared with 1939. A well-known example of amalgamation in Anglesey is the farming partnership of Messrs. Jones Bros., of Plas Llandegfan, Menai Bridge, who have shown how co-operation through partnership can work.

The three brothers were born at Bryn Eryr, Llansadwrn, a holding of 185 acres and started farming at a young and ambitious age during the depression years. In 1938 the partnership took over the tenancy of Plas Llandegfan, a nearby farm of 485 acres. They soon discovered the potential of direct reseeding and the value of liming, manuring and good grassland management. They have concentrated on the production of beef cattle and fat lambs off grass, and they now jointly occupy 1,250 acres of which 635 acres are owner occupied. One thousand fat cattle and about 2,000 fat lambs are produced annually.

The responsibilities for running the business are divided to correspond to the individual abilities of the partners. Amalgamation has been carried out in an organized way; the holdings join each other, and the three partners live in strategically placed homesteads.

The Jones Brothers are also leaders of the agricultural industry. Mr. Cledwyn Jones is the Chairman of the Anglesey Agricultural Executive Committee, Mr. O. J. Jones is the Chairman of the Anglesey Agricultural Society and Mr. Emyr Jones has been Church Warden for 32 years.

*FROM THE ALS*

# Multi-purpose Ventilated Flat Floor

**K. S. Lycett**
*Agricultural Land Service, Nottingham*

DRYING and storing grain *in situ* on a barn floor has now become an established practice on arable farms, despite the fact that the system has disadvantages. Levelling out the top of a large mass of grain, to ensure even drying, is one of them, dust is another, but the biggest snag arises from the use of loose air ducts laid across a floor at frequent intervals as a means of 'bottom' ventilation. Buried in grain, ducts are often unseen until flattened by a lorry or tractor wheel each time the store is unloaded. Moreover, those that escape damage in this way face a second hazard whilst they are being stacked away when not in use. Apart from the time and space that this operation entails, ducts once damaged cannot be re-used without repair. An obvious improvement would be to form the ducts in concrete below the floor level and cover them over with strong perforated metal cover plates flush with the floor. Unfortunately, as any one who has had experience with this type of construction will know, the cost is extremely high. Nevertheless, a 'flat floor' system of ventilation has tremendous advantages in spite of its cost. This has led to a search for a cheaper alternative, a common and very effective one being the honeycomb brick floor version. Constructed of common bricks laid dry on edge and built up off a concrete sub-base, the floor is cheaper than *in situ* ducts. Air is blown into the supporting honeycomb, divided up into sections for control, from a main duct built below floor level. The air escapes through the dry joints of the bricks and so through the heaped grain. There are disadvantages such as replacement of bricks that may get broken and the loose ones that rock under wheel load. The principle defect, however, is the likelihood of having to take out several thousand bricks to remove dust from out of the honeycomb in case of an infestation of grain mite.

There is another method illustrated in Figs. 1 and 2 on page 351 which deserves serious consideration because of its adaptability. It is a variation of the brick floor system in which pre-cast or pre-stressed concrete slabs 4 in. wide, laid over 9 in. thick concrete block sleeper walls set about 7 ft 6 in. apart, replace bricks. Free air movement in the plenum is facilitated by placing a 3 in. diameter land drain pipe between every two or three blocks and filling in the intervening gap above with concrete to provide a bearing for the end of the slats. The slats are set at about $\frac{1}{32}$in. apart and are dry jointed except for the ends which need to be bedded solid in cement and sand. Removable slats abutting the cross baffle walls allow for periodic cleaning out of dust from the plenum chamber. To reduce cost, the plenum

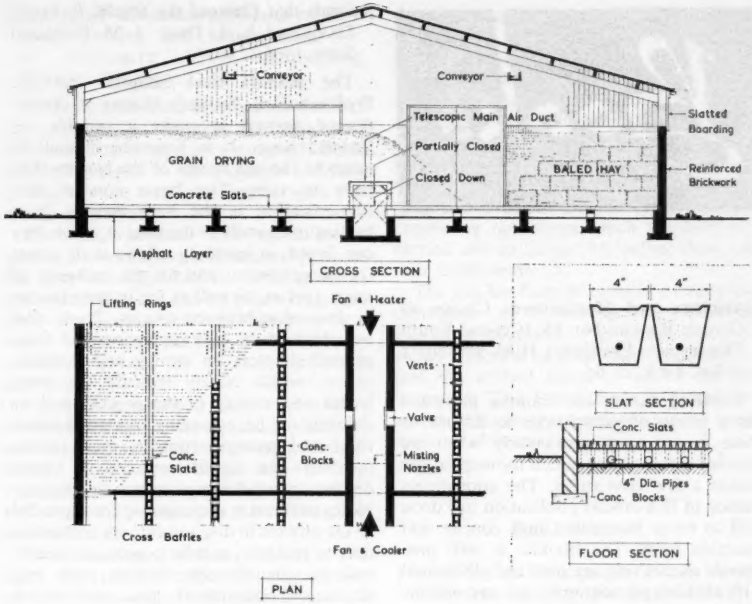



Fig. 1 Fig. 2

chamber floor may be formed of rolled ashes or pulverized fuel ash coated with bitumen. The main air tunnel walls may be constructed of concrete blocks built off a concrete base at a depth of not much more than 2 ft below ground level. Waterproofing and reinforcement is, therefore, unnecessary. To dry grain, the main air tunnel is raised in telescopic sections to give a 5 ft minimum head room so as to enable a man to walk along it and operate the air valves. When not in use, the top of the tunnel can be lowered again to fit flush with the floor.

An electric fan incorporating a heater bank installed at one end of the tunnel and one with a cooler unit at the other end enables a whole combination of ventilation methods to be used for farm work, from drying hay and straw bales, to chilling potatoes. Any section of the floor can be ventilated independently by using one or both of the fans as required, thereby enabling use to be made of the electrical equipment all the year round. The section shown is based on a standard frame spacing of five yard intervals. In addition to temperature control, misting nozzles can be installed for damping barley for grinding purposes or for conditioning potatoes.

By constructing the upper wall space between the top of the grain to the underside of the eaves gutter, as well as the gable ends, of 'gap boarding', dust can be cleared from the building by switching on one of the fans. Furthermore, the heater bank can be turned on to make the job more pleasant in cold weather when, say, riddling potatoes. Properly designed, a building of this kind has many possibilities on a farm and would compare favourably in cost with many of the movable air ducted systems now in use.

# Books

**Agriculture and Horticulture:** Choice of Careers Booklet No. 85. (Central Youth Employment Executive). H.M. Stationery Office, 1966. 2*s*. 6*d*.

Covering career and training prospects for a group of occupations as diverse as these is not easy, particularly when we remember that the so-called farming ladder misses a few vital rungs. The anonymous author of this official publication has done well to cover his subject in a concise and readable form. The booklet is well produced, attractively set out, and illustrated with sensible photographs; nor can anyone object to the price of a half-crown, seeing that this replaces what were originally two separate books, one on agriculture and another on horticulture.

Correctly, the first two-thirds of the book deals with the jobs. The various forms of specialism are listed and described, starting with the work of the practical man and woman and leading on to technical and professional careers. This is a realistic and useful section. There is no suggestion that everyone can become a farmer; instead the reader is told that 'without substantial capital it is very difficult'.

The final section on qualifications and training gives a fair survey but starts at the wrong end, which may tend to give a false impression. This is a common fault. I think it would have been better to cover the system of part-time education and training first, as this concerns most young people, before going on to farm institutes, colleges and universities in that order.

A mere half-page on City and Guilds examinations, out of a 47-page booklet, can hardly deal fully with a type of education and training which affects a very large proportion of young workers in agriculture and horticulture. This is a minor reservation and the booklet can be commended as a useful aid to anyone concerned with advising young people wishing to take up work on the land. It should find a place in most school libraries.

*G.S.B.*

**Animals that Changed the World.** P. D. C. Davis and A. A. Dent. J. M. Dent and Sons, 1966. 25*s*.

The authors have adapted the late Professor F. E. Zeuner's *History of Domesticated Animals* to make it suitable for young readers. It is, however, difficult to appraise the age ranges of the readers they have in view. The basic concept that domestication is the long process from taming of animals to the time at which they can breed in captivity allows wide scope for interpretation and for the inclusion of many species, as well as for inconsistencies in discussion between species. Thus, after an introductory note on dating and three general chapters on taming and domestication—which clearly indicate the great length and variety of the process and its differing tempo according to area, agricultural and pastoral contexts, and species involved—the authors proceed to liberal discussions of different orders and species. Notes on ferret and mongoose are appended to the process in dog and cat; elk and fallow deer to reindeer; gazelle to goat and sheep; and so on through bovines, the pig, elephant, horse, camel, asses and mules, and domesticated birds (including quail and pheasant) to a chapter on experimental and occasional domestication.

Much of the discussion is plausible but, with some elementary knowledge of the characteristics of modern breeds of farm livestock throughout the world, the critical reader will find some of it difficult to accept. Has domestication always reduced size (pp. 28, 46) and is 'lop ear' a characteristic of domestication (p. 43) and what evidence is there that 'the mouflon and urial are bound to have been cross-bred on many occasions' (p. 51)? In comparisons of present-day domesticated livestock with survivors of wild populations no allowance is made for genetic drift and little for the effects of management on growth, form and development. Greater weight could well have been placed on the isolating mechanisms differentiating populations and types.

The book could be useful as a prize to junior pupils, as a lighter reference in libraries of farm institutes, etc., but might be most appropriate as a basis on which more advanced students and teachers could, in discussions and seminars, stimulate the detection of illogicalities and fallacies. However, as no references are given to other literature, it would not be easy to discover their origins. The drawings by Sven Berlin illustrating the text are attractive but not always particularly relevant or apt.

*J.E.N.*

**Multilingual Illustrated Dictionary: Livestock Feeding and Management.** H. STEINMETZ. 5240 Betzdorf/Sieg, Western Germany. D.M. 18.

With the likelihood of closer ties between the countries of Europe, this illustrated dictionary, covering a wide range of animal husbandry topics in six languages will help to improve the understanding between this group of countries.

Scientists, advisers and agriculturists visiting European countries often experience the greatest difficulties in defining terms and practices in any but their own language. Here is a book which will help to correct likely misunderstandings and lead to greater exactness in animal husbandry matters.

The book is arranged under twelve main subject headings: anatomy and physiology, veterinary science, nutrition, forage, feedingstuffs, cattle and sheep, and poultry management, breeding, poultry production, milk and milk products, and marketing, for easy reference.

Much time must have been taken by the large team of international collaborators in achieving such a helpful layout of material. Many of the topics, including the animals themselves, their feed, housing, utensils and machinery, are well covered by small, neat drawings depicting exactly how the item is described in the various languages.

The languages covered are German, English, French, Spanish, Italian and Dutch. In addition to each item being covered in all six languages under subjects, a separate coloured alphabetical list of topics is provided under each language.

The book is pocket-sized and printed on excellent strong, glossy paper, and will prove to be extremely popular with anyone covering animal husbandry subjects in any but his own language.

*W.L.*

**Multilingual Illustrated Dictionary: Farm Implement and Machinery,** 2nd Edition. H. STEINMETZ. 5240 Betzdorf/Sieg, Western Germany, D.M.18.

This dictionary in German, English, French, Spanish, Italian and Dutch is prepared on the simple principle that the easiest way to describe an implement or machine to ensure recognition is to draw it. This applies particularly to agricultural machinery, where there are many variations of type to suit farming conditions and requirements in different countries. This glossary is well prepared and illustrated by use of a vast number of small but clear line drawings, generally providing a perspective view of each machine. The book is a handy size—approximately 6 in. × 4 in.

The subject matter is divided into twelve main groups, which follow a logical sequence from power units and tillage equipment to machines for sowing, distributing, harvesting, conservation and storage. There are also sections on equipment for livestock husbandry and simple processing operations which are normally carried out on farms. Altogether there are over 2,000 items.

The aim has been to assist in overcoming difficulties of communication between European countries. The editor has consulted a number of individuals and firms to find the correct terms in all of the six languages. This is a difficult task, and the author is to be congratulated on the large measure of success achieved.

*C.C.*

**Books Received**

*The Millets.* A Bibliography of the World Literature covering the years 1930–63. The Scarecrow Press Inc., Metuchen, New Jersey, 1967. $5.

*Documentation in Agriculture and Food.* No. 87. Market intelligence for agricultural advisers. Organisation for Economic Co-operation and Development, 1967. 9*s.*

*Scale of Enterprise and Structural Change in British Pig Farming.* Report No. 164. David Juckes. Department of Agricultural Economics, University of Exeter, 1967. 10*s.* 6*d.*

*The Market for Beef and Veal and its Factors.* Organisation for Economic Co-operation and Development, Château de la Muelle, 2 rue André-Pascal, Paris 16. 1967.

*The Heated Glasshouse Tomato Crop in 1964.* F. R. No. 163. J. A. H. Nicholson. Department of Agricultural Economics, University of Nottingham, 1967. 5*s.*

*The Decision to Innovate.* A Comparative Study of Adopters and Non-adopters of Bulk Milk Collection. G. F. C. Mitchell, Department of Agricultural Economics, University of Bristol.

*Results of Experiments at Experimental Husbandry Farms* 1965. No. 13. Part I Crops. Ministry of Agriculture, Fisheries and Food.

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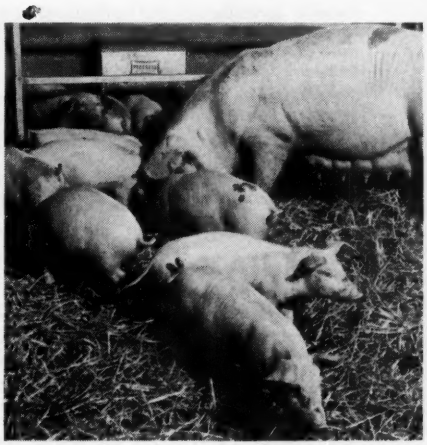

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*RC 213/132/05*

**Duties:** To take charge of field planning teams and to be responsible for regional conservation planning on a catchment and/or settlement plan basis.

**Qualifications and terms:** A degree in Agriculture or related natural science e.g. geography, geology, etc., preferably with post graduate training and/or experience in the use of aerial photography, practical surveying and land use planning. Salary £1,180 to £2,600 a year plus 25% gratuity. A supplement ranging from £200 to £300 a year is also payable direct to an officer's bank account in the United Kingdom or the Irish Republic. Both the gratuity and supplement are normally tax free. Three-year contract.

## GAMBIA

### Scientific Officer (Animal Husbandry)

*RC 213/68/01*

**Duties:** To improve livestock production; train extension staff and advise Director of Agriculture on Animal Husbandry matters; to test forage crops for inclusion in grassland improvement programmes; trekking as necessary to advise on local Animal Husbandry problems.

**Qualifications and terms:** A degree in Agriculture with tropical agriculture Diploma or considerable tropical experience. Salary £1,140—£2,224 a year plus 25% terminal gratuity. On contract for two tours of 15-24 months.

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*RC 213/137/02*

**Duties:** To advise the Planning Division of the East Pakistan Agricultural Development Corporation on the planning, preparation and revision of agricultural development programmes in East Pakistan.

**Qualifications and terms:** A degree in Agriculture with a recognised post-graduate qualification. Candidates should have had long experience in planning in all fields of tropical Agriculture. Salary £4,500 to £5,000 depending on experience subject to British Income Tax, plus a variable non-taxable overseas allowance currently payable at the rate of £595 (Single), £1,140 (Married unaccompanied), £1,325 (Married Accompanied). Two-year contract.

## OFFICIAL APPOINTMENTS

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### Research Officers—Grade II

*RC 213/173/011*

**Duties:** To work at one of the four Livestock Breeding Stations on general farm management development and multiplication of improved breeds of cattle, maintenance of records and statistics and minor research projects into animal reproduction, genetics, nutrition and physiology.
**Qualifications and terms:** A degree in Agriculture with preferably some post-graduate experience in research work into livestock reproduction, nutrition, physiology and genetics. Salary £1,329—£2,757 a year plus 25% gratuity. 21 to 27 months' contract.

### Agricultural Officer (Dairy Technology)

*RC 213/173/028*

**Duties:** To advise on management of dairy farms, co-operative dairy plants and processing and marketing of dairy products.
**Qualifications and terms:** A degree in Agriculture with dairy production as a major subject and experience in the operation of dairy plants. Salary £1,329—£2,757 a year plus 25% gratuity. 21–27 months' contract.

### Agricultural Economist

*RC 213/173/030*

**Duties:** To lead the Planning and Investigation Unit of the Ministry of Land Settlement and Water Development in the examination and valuation of settlement and irrigation schemes, and to train officers engaged on these schemes.
**Qualifications and terms:** A degree in economics with agricultural qualifications or an honours degree in agricultural economics plus some previous experience. Salary, £2,814—£3,000 a year plus 25% gratuity. 21–27 months' contract.

### Plant Physiologist

*RC 213/173/021*

**Duties:** To study the life processes of plants of economic importance and to correlate his/her findings to the problems of crop production. The work would involve liaison with the horticulturist and plant breeder.
**Qualifications and terms:** A degree in botany with specialisation in plant physiology. Field experience with tropical plants is desirable. Salary, £1,329—£2,757 a year plus 25% gratuity. 21 to 27 months' contract.

# UGANDA

### Principal/Senior Research Officer

*RC 213/183/05*

**Duties:** To take charge of a small section of scientists investigating the breeding and selection of food crops.
**Qualifications and terms:** Candidates must have at least a second class honours degree in Botany or Agricultural Botany with post graduate training in plant breeding and overseas experience. Salary, £2,814 to £3,234 a year, plus 25% gratuity. 21–27 months' contract in the first instance.

### Agronomists

*RC 213/183/06*

**Duties:** To carry out an experimental programme on either tea or tobacco with the object of improving production methods and quality.
**Qualifications and terms:** A second class Honours degree in Agriculture with at least three years experience of tropical agriculture, preferably specialising in one of the above-mentioned crops. Salary £1,374—£2,757 a year, plus 25% 21–27 months' contract.

*If you wish to apply for any of these appointments, or you are interested generally in an appointment overseas, please write giving your full name, age and brief particulars of your professional qualifications and experience to the:*

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### AGRONOMISTS

Agronomists with interests in Agricultural Climatology, Crop Microclimate or Crop Physiology are invited to apply for appointment to the academic staff of the Department of Agronomy, Institute of Agriculture.

A new Department of Agronomy was created recently and the present staff consists of a Professor, a Senior Lecturer and a Lecturer. The Department has interests in crop-environment relationships and is active in legume and cereal breeding. The Department plans to extend its teaching and research activities. The fields and background sought are in the general areas of:

(*a*) *Crop Physiology*. Either in (i) the water relations of plants; or (ii) the carbohydrate metabolism of plants.

(*b*) *Crop Micrometeorology*. In the area of energy balance of crops.

(*c*) *Agricultural Climatology*. To determine lengths of growing season, drought frequencies, etc.

Applications are invited from graduates appropriately qualified in any of the above-named fields. One position at the level of Reader or Senior Lecturer is available immediately. It is anticipated that a further two positions at Lecturer/Senior Lecturer level will become available later this year.

The salary for a Reader is $A8,600 p.a. and the ranges for Senior Lecturer and Lecturer are $A6,500—7,600 and $A4,800—6,340 p.a., respectively. Superannuation will be similar to F.S.S.U. in all cases.

The appointees will be expected to develop teaching and research in their fields and can expect support to do this. The Department of Agronomy is one of the four major groups in the Institute of Agriculture within the University, the others being Soil Science and Plant Nutrition, Animal Production and Agricultural Economics. Glasshouse field station and computer facilities are available.

Intending applicants are requested to obtain details of the procedure to be followed in applying for the post and a copy of the conditions of appointment before submitting their applications. This information is available from the Association of Commonwealth Universities (Branch Office), Marlborough House, Pall Mall, London S.W.1.

Applications close in Australia and London on **2nd August 1967.**

Specific enquiries concerning the teaching or research programme should be addressed to the Head of the Department, Professor W. R. Stern, in the University.

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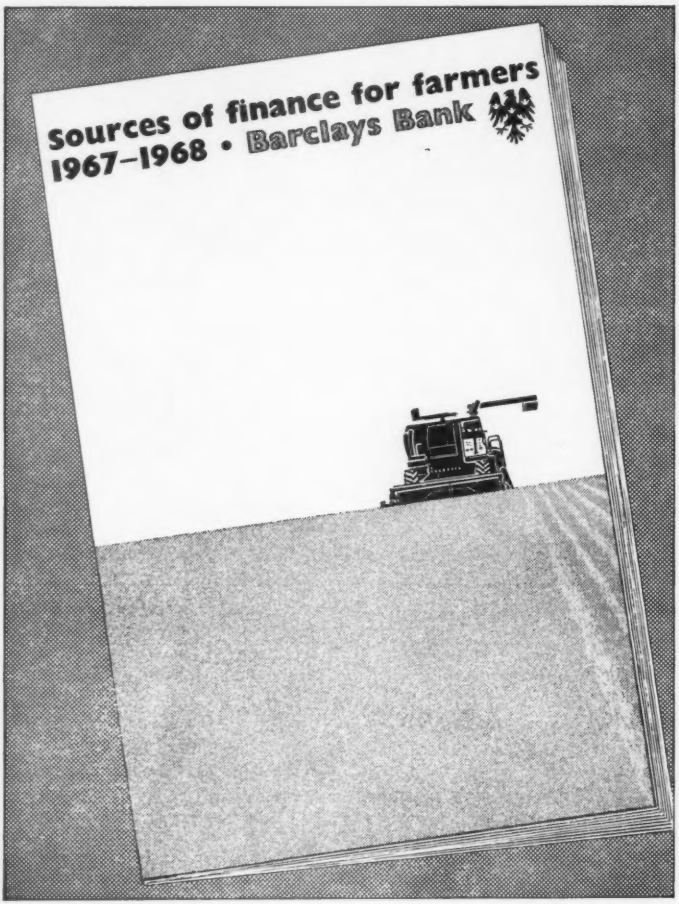


This is the current edition of Barclays guide to grants and loans available to farmers. Written in consultation with the Ministry of Agriculture, it is of proven value to farmers and others interested in agricultural finance. Copies may be obtained free from any branch of the Bank.

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